WIN! Amiga 2000 Treasure Hunt p. 62

AMIGA WORLD

August 1988
U.S.A. $3.95
Canada $4.50
UK £2.50
An IDGC/I Publication

ECLIPSING THE COMPETITION

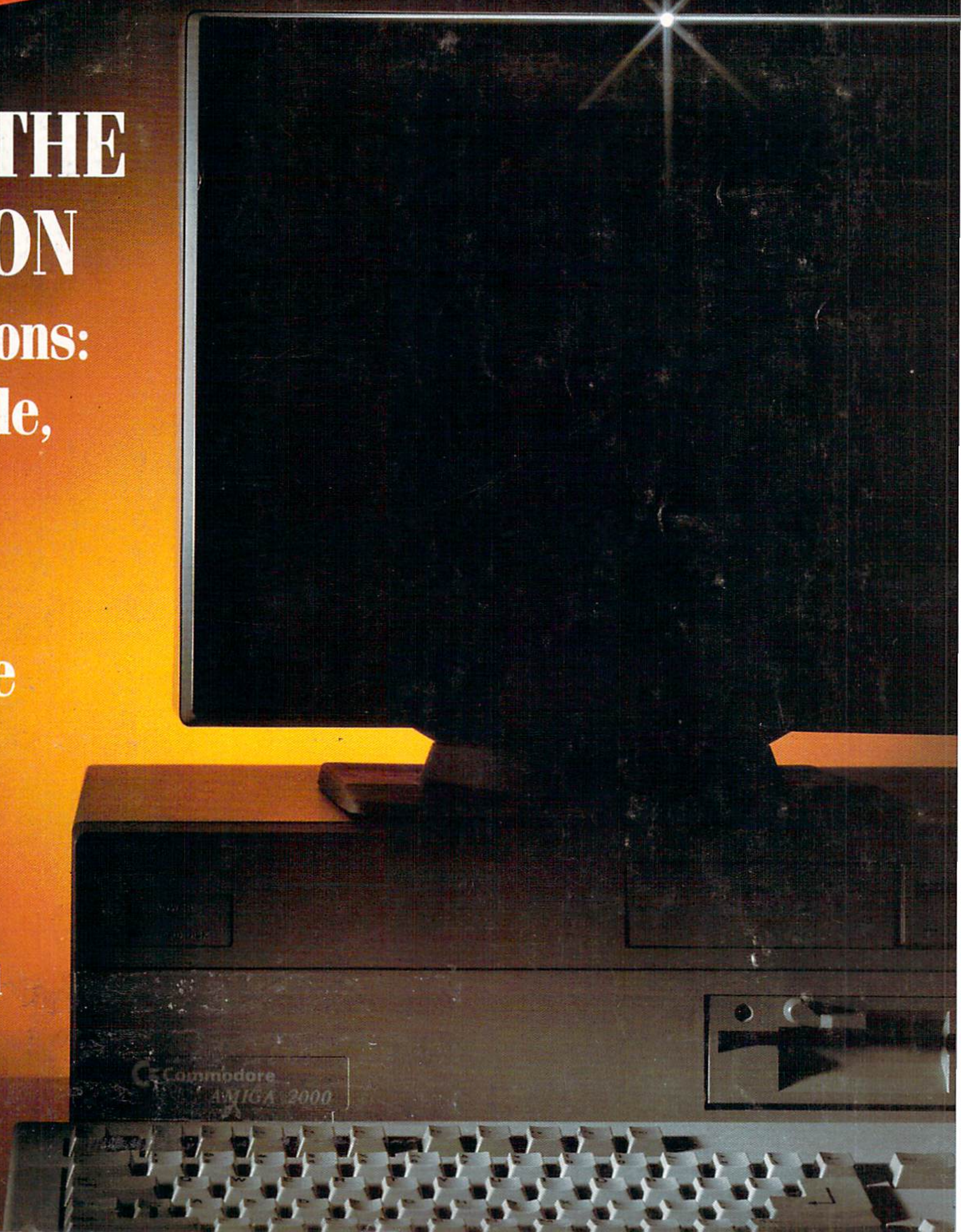
Amiga Workstations: Powerful, Versatile, Affordable

PLUS!

Hidden Hardware In DOS 1.3

ARP Bites DOS!
—see page 40

BASIC Animation



08
0 74470 65948 8

PHOTON VIDEO
Cell Animator



PROFESSIONAL ANIMATION! —
Now take advantage of "pencil testing" your animation in the privacy of your own home studio! With Cel Animator you can preview scenes, polish your work and know it performs the way you envisioned.

UN-EQUALLED VERSATILITY—
Cel Animator provides versatility that's unavailable with film, or the expensive Lyon-Lamb type stop-motion video tape equipment. With Cel Animator, your drawings are stored on a computer disk so each frame can be called up repeatedly and manipulated within a sequence after being "shot" only once. This is achieved because computer disk storage is "random access," meaning; any information stored on the disk can be called up at random, in whatever order required, as often as necessary!

BREAK THE "SEQUENTIAL" DILEMMA —
Tape and film are "sequential" and require you to shoot a "cycle" over and over again until the required number of repetitions are completed, or re-expose a held drawing for many consecutive frames. Using Cel Animator, however, you may simply create each drawing once, and then create a list, identifying each frame by number, and the program will call up the stored frame from memory and replay it as often as it is called for, or in whatever order you specify, and you can add or delete drawings. Essentially, the program follows your "exposure sheet" for you!

You can also experiment with your timing by simply changing the display time between frames; if you shoot a "pose test" you can adjust your timing repeatedly without reshooting anything, then add your breakdowns, re-time your delays and check again. No need to add in-betweens until you've fine-tuned your pose test.

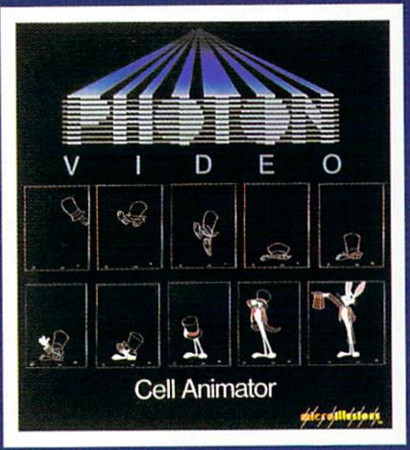
CONTINUOUS PLAY OPTION—
The program can also replay your sequence of frames in a continuous loop, so you can sit back and review the action repeatedly without having to rewind and play a video tape over and over again, or without ever having to wait for film to be shot, processed, and edited.

SOUND SYNCHRONIZATION—
Cel Animator allows you to digitize your pre-recorded sound track (dialogue, music or effects), and replay them frame by frame; or select any group of frames to replay, enabling you to locate and identify sounds according to frame number prior to doing your animation drawings. Then, review your pose test or completed animation synchronized with your digitized sound track, and you can then print an exposure sheet, vowels and consonants paired with frame numbers.

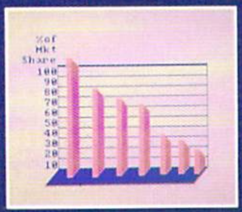
INTRODUCE COLOR! —
Finally, if you own one of the many paint programs available such as Photon Paint, you can paint your pencil drawings right on your computer, and use Cel Animator to replay them in full color, over any background you create. It is also possible to send your completed color scenes to video tape; thus producing a full color animated sequence right in your own home on your VCR or you can use Photon Video's Transport Controller software.

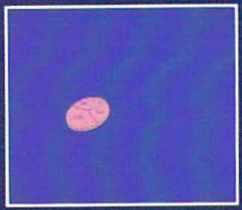
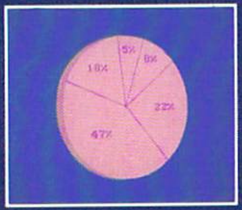
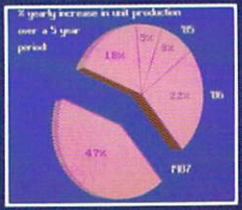
COMPATIBILITY —
Photon Video Products are fully compatible with most third party art, animation and rendering software systems.

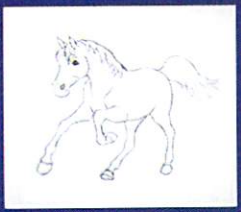
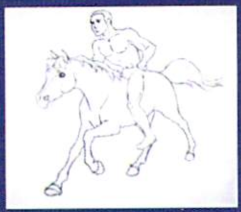
TRANSPORT CONTROLLER —
This module allows you to take your animations frame by frame to video tape, by way of popular frame by frame controllers such as Lyon Lamb.™



OTHER PHOTON VIDEO PRODUCTS —
- EDIT 3D, Photon's powerful solid object Editor.
- RENDER 3D, Photon's amazing solid object rendering system.
- Photon Paint, this immense paint system gives you all you are accustomed to in a professional paint box, plus many advanced features like surface mapping and light source control!






microillusions™

17408 Chatsworth St., Granada Hills, CA 91344 Inside CA 818/360-3715, Outside CA 800/522-2041

12-109

Circle 138 on Reader Service card.

New! Version 3.0 includes overscan, half-brite support and more!



DIGI VIEW

DELIVERS ULTIMATE GRAPHICS POWER

Bring the world into your Amiga with Digi-View, the 4096 color video digitizer. In seconds you can capture any photograph or object your video camera can see in full color and with clarity never before available on a home computer. Digi-View's advanced features include:

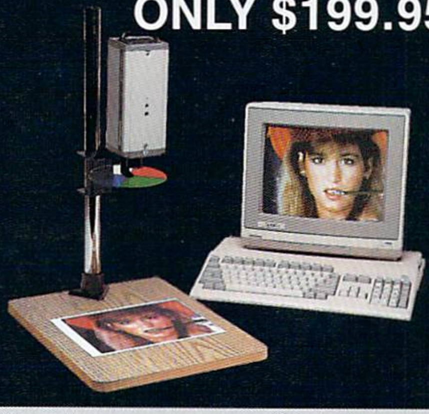
- Dithering routines give up to 100,000 apparent colors on screen
- NewTek's exclusive Enhanced Hold-and-Modify mode allows for exceptionally detailed images
- Digitize images in any number of colors from 2 to 4096
- Print, animate, transmit, store, or manipulate images with available IFF compatible programs
- Digitize in all Amiga resolution modes (320x200, 320x400, 640x200, 640x400)

"Digi-View sets new standards for graphics hardware"-*InfoWorld*

Digi-View is available now at your local Amiga dealer or call:
1-913-354-1146 or 1-800-843-8934

ONLY $199.95





NewTek
INCORPORATED

All photos actual unretouched Digi-View pictures shot directly off the 1080 Amiga monitor.

Circle 102 on Reader Service card.

A Powerful Creativity Tool for Serious Layout Artists, Designers & Business Professionals.

EXPERTS SAY IT'S THE BEST!

If you're looking for the best in desktop publishing, listen to what the experts say about Professional Page. They call it an *industry heavyweight* and a *world class innovator*. That's because it's so richly endowed with sophisticated high end features you won't find anywhere else.

But Professional Page is more than a revolutionary page layout tool that combines color graphics and precision typesetting. In the hands of a professional, like you, it's an unfair advantage. If you're serious about professional page layout and want to experience the thrill of creativity, then get Professional Page. It's at your Amiga dealer now.

Ranks Among The Best

Professional Page can hold its head up in the company of such heavy hitters as Ventura Publisher and PageMaker.

Electronic Composition & Publishing March/April 1988

More reasons to own Professional Page

... compelling ... innovative ... deep access to the powers of PostScript ... good range of object oriented drawing tools ... the program is fast, its features are well integrated and Gold Disk appears committed to further refinement ...

Electronic Composition & Publishing March/April 1988

From concept to color seps

After years of preparing black and white camera-ready art for color printing, we can now design and compose in color and produce plate-ready final film.

Vellum Print & Graphic Services Concord, Ontario



GOLD DISK

A WHOLE NEW AGE IS ABOUT TO DAWN FOR YOU AND YOUR AMIGA

Net Income $ Millions

129 153 105 147 169 120 145 89

1985 1986 1987 1988

THE AGE OF PROFESSIONAL PAGE

Kind of impressive, isn't it? We're not claiming this is the ultimate in design from Madison Avenue. But we do think it holds real potential for career advancement and enhanced business communications. Just think what this type of presentation can mean for communications with your staff, your superior, your customers and your suppliers. It gives you impact. It makes your point of view more persuasive.

How this page was created

- The big A was drawn using Professional Page's built-in structured drawing tools.
- Gold Disk, above the A at the top, was set and italicized. Any typeface you use may be bolded, italicized, and underlined, multiplying the impact of each face.
- An orange screen was placed in back of the A. You can form any number of patterns, line weights, and screens. And you can easily center, kern or lead blocks of type.
- The bar graph could have been imported from any Amiga paint or drawing package. We drew it quickly using the built-in drawing tools.
- The Rolex was created in a paint program, then imported and sized. This is a very versatile feature of Professional Page. You can manipulate pictures and drawings, sizing and cropping them at will.
- The Gold Disk logo was not digitized. It was created with the built-in drawing tools in just a few minutes. Once on disk, a logo may be used over and over again.

That's only the tip of the iceberg. With time and practice you can learn to produce stunning presentations in a fraction of the time. Comes with excellent manual. Full telephone support. Requires Amiga with 1Mb of memory. Outputs to PostScript laser printers and typesetters and dot matrix printers (color or black & white). Includes built-in color separation.

GOLD DISK
P. O. Box 789,
Streetsville, Mississauga,
Ontario, CANADA, L5M 2C2
Phone: (416) 828-0913
for orders: 1-800-387-8192.

This entire document and ad was created and color separated using Professional Page V1.1

Precision Typesetting

Heady stuff ... [will] take us to entirely new realms in desktop publishing ...is impressive ... can handle typographically demanding documents.

Amiga World, May 1988

No contest

... decimates its Amiga competition.

Amiga World, May 1988

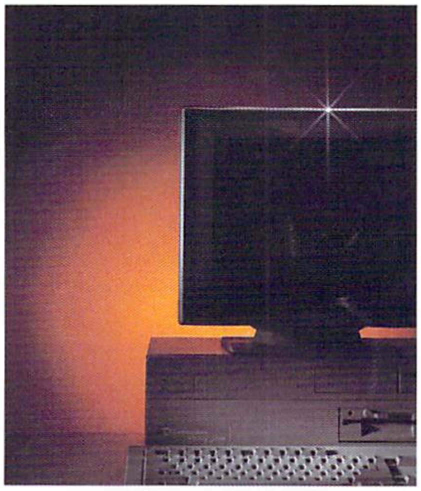
Advancing the Art of Desktop Publishing

This *entire* ad was created and color separated using Professional Page. For a full color brochure write or phone Gold Disk. For same day order processing 1-800-387-8192. Still only $395. Dealers may sell for less. PageSetter owners call for our attractive upgrade offer.

Circle 150 on Reader Service card.

VOLUME 4, NUMBER 8 AUGUST 1988

CONTENTS



Yes, that is a solar eclipse of sorts happening on this month's cover. Why? Because powerful personal computers like the Amiga are taking over the scientific/graphics workstation market from the specialized workstation systems makers such as, right, Apollo and Sun! Comparable computing power teamed with greater versatility at a far lower cost is the reason why the Amiga and other personals are overshadowing the former heavyweights in the market. So, if you're in the science, engineering, professional graphics, education, or similar fields, take a good look at our "Workstation Amiga" feature.

FEATURES

ARTICLES

COLUMNS

DEPARTMENTS

WIN AN AMIGA 2000!
Plus a Getaway Weekend for 2. We've reached Part Two of *AmigaWorld*'s three-part **Summer '88 Treasure Hunt**. A fresh new set of clues is waiting on **page 62**. Quit cooling your heels and get back on the track!

COVER PHOTOGRAPH BY PAUL AVIS

AmigaWorld (ISSN 0883-2390) is an independent journal not connected with Commodore Business Machines, Inc. *AmigaWorld* is published monthly by IDG Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458. U.S. subscription rate is $24.97, one year; 38.00, two years; $53.00, three years. Canada $34.97 (U.S. funds), one year only. Mexico $32.97, Foreign Surface $47.97, Foreign Airmail $82.97 (U.S. funds drawn on U.S. bank). All rates are one-year only. Second class postage paid at Peterborough, NH, and at additional mailing offices. Phone: 603-924-9471. **Postmaster**: Send address changes to *AmigaWorld*, Subscription Services, PO Box 58804, Boulder, CO 80322-8804. Nationally distributed by International Circulation Distributors. *AmigaWorld* makes every effort to assure the accuracy of articles, listings and circuits published in the magazine. *AmigaWorld* assumes no responsibility for damages due to errors or omissions.


COLOR FILM
FOR COLOR SLIDES

ZEITGEIST

Great expectations.



AmigaWorld was ready for the beach this month, but it rained. Damned New England weather; there'll be a foot of snow again before you can say "Legs Diamond" (Linda, Senior Editor/News-and-Flooze gal, left center), or "flickerFixer." Which reminds us: we did spend some considerable time this month (see the feature article *and* the Reviews) on a product to help you beat the hi-res interlaced blues. Our writers loved it; our Reviews man said "it's leagues ahead of sunglasses." Well, at $595 it should be! We spent only about $100 to outfit the whole staff, including the Teddy Bears, who were miffed because they were supposed to be on last month's cover. And yes, Bob's dog Mae—to the left of Bob, the ramblin' wreck of Amiga Tech, right. All to show you a cheaper, and more fun, way to do it.

We hope the sun is shining where you are—and, by the way, get involved in our Summer '88 Treasure Hunt and win some good stuff. (Before Barbara does; she's our Reviews/Fashion Editor, right center—Barb made her mother change her name and move to Peoria, Illinois, so she could send in a phoney correct solution.) That spacey character in the center rear is Guy, the person responsible for *AmigaWorld.* The rest of us are Dan (senior word warden, behind the potted palm), Shawn (head manager-type and video mogul, supporting "Legs"), and, of course, the bears. The person who orchestrated this whole scene is Roger Goode of our design staff. The photographer would rather keep his name out of it—but, what the heck, Frank Cordelle did it and *he* should have known better!

I'VE BEEN DOING a lot of traveling lately—Hannover, Washington, Atlanta, Kansas, Florida, New York—and I'm approaching a state of permanent jet lag. My kids don't recognize me anymore, and hotels are beginning to feel like home. I hope you all appreciate my efforts and don't think that I have a glamorous job. It's a lot of fun, but sometimes I feel envious of mall janitors. All they have to do is shamble about, sweeping up cigarette butts. They don't have to travel, make speeches, or write editorials.

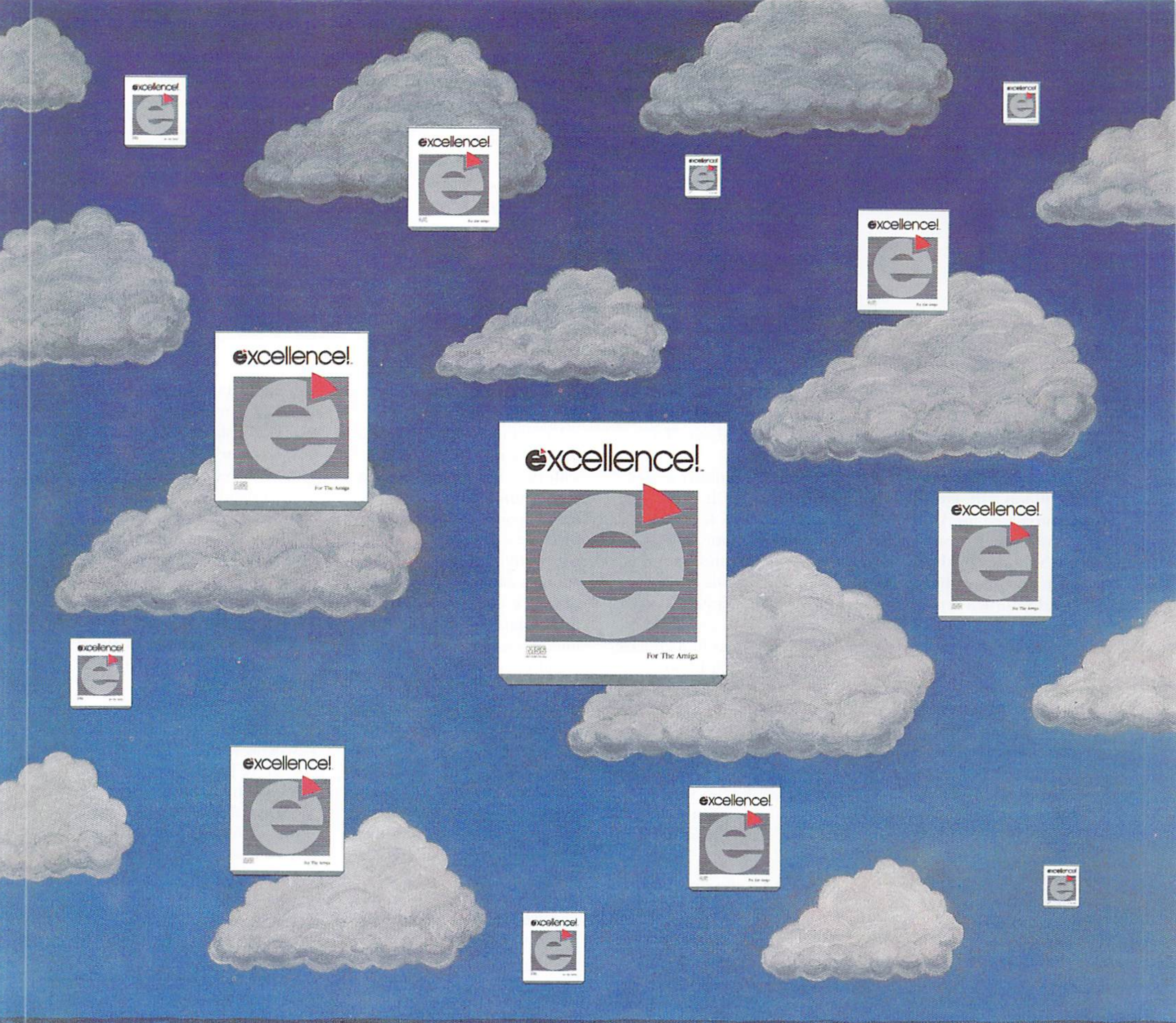
These past few months have been exciting for Commodore and the Amiga. New products have been announced and talked about. But when are all these things going to be available? When are they going to be real? I heard a number of questions like those when Commodore announced the A2000. Should I wait before buying something because a newer version will be coming along soon? Should I start thinking about trading in my A2000 for an A2500? I don't think so.

First, there is no guarantee that a particular new product will ever be for sale. Second, I wouldn't hold my breath on any of these new Amiga products. Some will be ready by the end of the summer, many will be ready sometime in the fall, and some won't be ready until 1989. Which ones will show up first? 1.3 will probably be the first. 1.4 and the new chip set might become 1989 products. The A2500s are just A2000s with extra boards and memory, so if you own a 2000, you already own a 2500 chassis. The Transputer is probably the longest shot of the bunch. I have my doubts about the release dates (and quality) of the two video boards, so if you need one, don't wait for Commodore. The new monitors depend on other manufacturers, so they are anybody's guess. I'm sure there will be an Amiga 3000 someday but I'm also sure that eventually there will be a manned mission to Mars.

Commodore is making an effort to make everything upgradable in the Amiga line. The A2000 can be turned into an A2500. Most of the software will work on all Amigas. Operating system upgrades are possible on all models. It may cost more to upgrade an older Amiga, but that's life. Eventually you will have to buy a new system or scrap some of your software—that's the cost of progress.

We will continue to tell you about everything that Commodore is working on for the future, but keep in mind that until a product shows up on store shelves, it isn't real. If you need something now, buy it now.

Guy Wright


excellence!
For The Amiga

REPARTEE

Comments, complaints, and concerns from

AmigaWorld *readers.*

TAMING AGNUS

FRED KUHLMAN'S LETTER in the May issue ["Fat Agnus On The Loose," Repartee, May '88, p. 10] was a lifesaver. When I first purchased my Amiga 500 six months ago, it came out of the box with exactly the same problem that Mr. Kuhlman described. I returned it to my dealer, who told me that he had no idea what the problem was. I received a new computer, which worked well until just recently. Then, the same problem recurred. I was frustrated to say the least. I had the machine packed and ready for the return trip to the dealer when your May issue arrived with Mr. Kuhlman's timely letter. I quickly unpacked the machine and applied pressure to the Agnus chip and the problem was corrected. Since then, I haven't had any problems with it.

James Lapkoff, M.D.
Milwaukee, WI

WELL-WORDED

GUY WRIGHT HAS had some solid gripes in his Zeitgeist column for the past few months, and most of us have been in agreement with him. However, he hasn't mentioned the worst plague of all—the horrible state of written documentation.

Have you ever driven into a strange city, stopped the nearest guy on the corner and asked him how to get to Main Street? He gives you a ten-minute monologue, you thank him, drive away, and then turn to your wife and say, "Jeez, what did he say?" Your wife tells you she couldn't understand a word of it either. That's the way I feel when I plunk down a hundred bucks for a program and, with the aid of five friends, can't figure out what the manual is trying to say.

Don't say clear and concise instructions can't be written. Thousands of us have built Heathkit computers that were totally new to us. If cake recipes were written like software documentation, no one would eat cake.

Larry T. Killen
San Angelo, TX

NEW MOTHERBOARD

AT THE RECENT NCGA show, I expressed to Paul Higginbottom, Commodore's Amiga Products Manager, my concern about the future of the Amiga 1000. I am worried about the much talked about increase in chip RAM to 1MB or more in the A500 and A2000. I forsee software that will require this and that will not operate on the A1000. I suggested that Commodore attempt to make an upgraded motherboard for the A1000 that would allow us to have the expanded capabilities of the other machines, yet still allow us to use all of the peripherals, such as internal RAM expanders, that we have invested in during these past two and a half years.

Unfortunately, Mr. Higginbottom was not impressed with the idea. He feels that a new motherboard for the A1000 would cost as much to produce as a complete A500 and would not have a large enough sales potential to justify the costs involved. He did finally agree to consider the idea if we, the A1000 owners, could prove that there is enough interest in such a product.

Now it's up to us. Send letters to Paul Higginbottom and Irving Gould, Chairman of the Board, at Commodore. Get up a petition at your local users group, post messages on the BBSs and commercial services. Don't be left behind and lose your investment in those expensive add-ons for the A1000.

Rick Jones
Orange, CA

VAX FACTS

IN A NUMBER of articles, *AmigaWorld* has referred to a computer called the VAX PDP-11. Actually, the VAX and PDP-11 computers are completely different machines.

The PDP-11 family consists of 16-bit minicomputers, while the VAX line consists of newer, 32-bit machines. Both lines are made by Digital Equipment Corp. (DEC).

These machines often serve as microcomputer network host systems and database servers. In fact, Apple recently signed a contract with DEC that establishes the Mac as a business workstation for use with VAX systems. Since all of the networking protocols are or will be published, this would be a great area in which to develop Amiga applications that could work with VAX systems, Macintoshes, and Mac-VAX applications.

Christopher R. Hertel
Winnetka, IL

NEGLECTED

I AGREE WITH Guy Wright [Zeitgeist, June '88, p. 8] that "U.S. manufacturers should be more considerate of Amiga owners overseas." I have purchased a wide range of software, and the user support has been non-existent.

I have filled out registration cards to receive information about upgrades and new products, but the result of my efforts has been nothing! This applies even to products like DeluxePrint (Electronic Arts) and DigiPaint (NewTek), of which new versions have been released. Do software companies have the insular attitude that Amigas are only used in the U.S.?

Wan Kwang Kow
Singapore

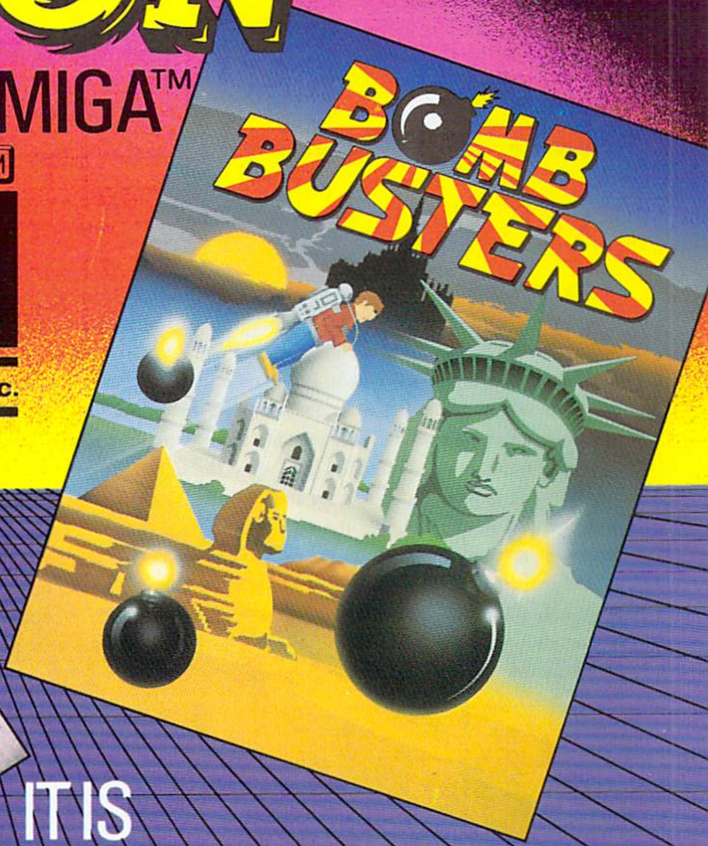
Send your letters to: Repartee, *AmigaWorld* Editorial, 80 Elm St., Peterborough, NH 03458. Letters may be edited for space and clarity. ■

ARCADE ACTION

FOR YOUR AMIGA™

FROM ReadySoft Inc.





IT IS THE YEAR 2001

During a recent wave of terrorism, bombs were planted throughout the famous buildings of the world. You, as leader of the crack bomb squad, Bomb Busters, have been summoned to defuse the bombs. Equipped with only a jet pack, you must fight your way through 100 levels on two disks and save the world.

But hurry . . . time is running out!

AFTER CENTURIES

of oppressive rule by the Tyrans, Lord Mantrex and his Star Warriors rebelled and attempted to win the freedom of their planet. After years of bitter fighting, the remnants of Lord Matrex's forces have gathered to face the final assault by the Tyran Deathbots.

You, as Lord Mantrex, must defeat the Tyrans and win back the freedom of Ganymed.

Dealer Inquiries Invited

Circle 24 on Reader Service card.

Please rush me:

☐ **BOMB BUSTERS** @ $29.^95 US ($34.^95 CDN)

☐ **GANYMED** @ $29.^95 US ($34.^95 CDN)

Payment by:

☐ Check ☐ Money Order ☐ VISA ☐ Mastercard

Card #: ______

/ ______ ______

Expiry Date Signature

Please add **$4.00** for shipping and handling. Ontario residents please add 8% P.S.T. No C.O.D. please:

NAME: ______

CITY/TOWN: ______

STATE: ______ ZIP: ______

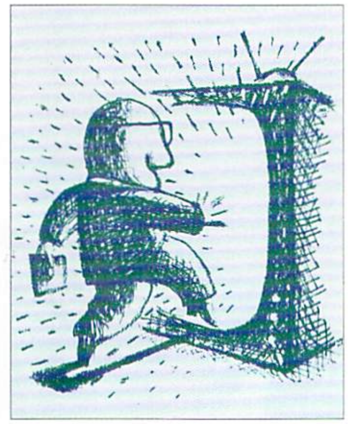
ReadySoft Inc.

Ready Soft Inc.,
P.O. Box 1222,
Lewiston, N.Y.
14092

PHONE ORDERS: (416) 731-4175 Please have credit card number ready

NOTEPAD

Compiled by Linda Barrett

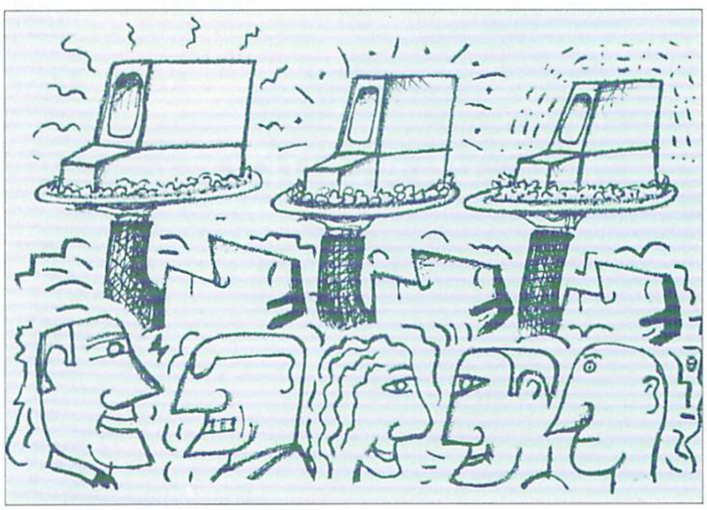


Artists' Showcase

VIDEO ANIMATORS AND computer graphics artists can now take advantage of a new way to display their talents. The Avant Garde Network (AGN) of Mount Pleasant, Michigan has opened of a graphics/animation showcase, giving individuals, groups, and manufacturers a chance to show their works and their wares.

Artists can submit their videos and slide shows to AGN, which distributes television programming to broadcast and cable operators, and AGN will consider them for possible broadcast on the showcase programs. "There really has not been an open channel available for these artists to show their stuff," said an AGN spokesperson. In the past, computer trade shows and video fairs were the only way for the public to get a look at the work of computer artists.

Artists will receive full credit for their efforts, and each display of artwork will be captioned. Manufacturers of the equipment used in producing the art will also be credited. Awards for outstanding work will be presented bi-monthly. Computer art from all levels of technical sophistication will be considered, and there are no submission fees. Artists should submit their work on S-VHS, VHS, or ¾-inch videotape to Avant Garde Network, PO Box 919, Mount Pleasant, MI 48804. Submission of a tape authorizes the network to broadcast, cablecast, or satellite telecast the artwork for up to one year from the date the material is received. AGN also reserves the right, if necessary, to edit artwork to accommodate their programming schedule.
—SL



Show Hopping

AFTER A WINTER of hibernation, the Amiga awoke with a roar this spring and attended three shows in two and a half months. Commodore and the Amiga jetted from the Hannover Fair in Germany (see "Foreign Correspondence," p. 12 in the June '88 issue of *AmigaWorld*) to the Amiga Developers Conference in Washington, D.C. to Comdex in Atlanta, GA, leaving a trail of press releases behind. Beyond what was said you could watch a deft display of slight of tongue. How products and promises were presented depended on where you were.

THE AMIGA DEVELOPERS CONFERENCE

In April, the people behind the programs and peripherals invaded L' enfant Plaza Hotel for the Amiga Developers Conference, three days of intensive seminars, panel discussions, and speeches. Besides the usual hard-core techie seminars, this year's conference offered seminars on public relations, marketing, and selling products abroad. Most of the attendees (which for a change included company presidents and marketing directors) agreed that these seminars were a worthwhile addition to the agenda.

Commodore gave more detailed information about the products announced at Hannover and added a few new ones to the list. While the company openly discussed its products and plans, the general tone was cautious. Version 1.4 of the op-

erating system will feature "major revisions" to Workbench and is scheduled to coincide with the new chip set. To display the wonders produced by the new chips, Commodore is working on bi-sync monitors (15 and 31 MHz) that will support the non-interlaced modes. There was also some talk about a PVA (Professional Video Adapter, a combination genlock and frame grabber) board for the A2000.

Commodore was careful to point out that all the new product announcements were not finalized and things may change between now and when (or if ever) they are finished. Because the products are in the early development stages, listeners had to take the supplied specs with a few shakers of salt. The mere existence of specifications, however, showed the developers that Commodore had progressed beyond the stage of "wouldn't it be nice if we had a. . ."

On the marketing and promotion side, Commodore's plans for the Amiga are still pretty vague, but the company is beginning to pick a few directions. Vertical markets, education, and video were most frequently mentioned as targets.

The overall mood of the Developers Conference was optimism with substance. Attendees came away with a strong impression that the Amiga line is where Commodore aims to make its money in the future. The conference was smooth and well run, which indicated that Commodore is getting more serious about their developer support. For a change, developers not only enjoyed themselves but got the important material and information they needed as well.

COMDEX

The Amiga's prescence at Comdex also took a change for the better this spring, although it was slightly off the beaten track. Commodore's booth at the Atlanta show was always crowded, but the real action was across the street.

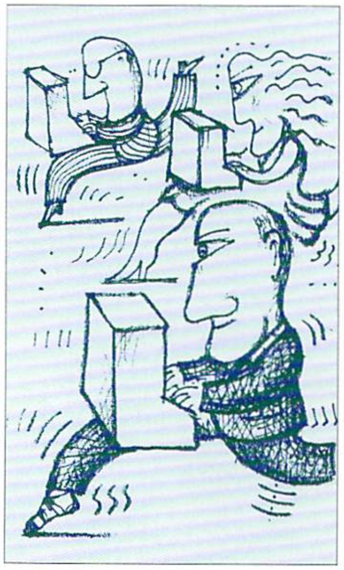
On the first day of the show, Commodore rented three large function rooms in the Omni International Hotel just across from the main convention center. At the morning press conference in the first room, Dr. Henri Rubin, Commodore's Chief Operating Officer, gave a very stiff talk on Commodore's plans to release its Unix board, 68020 board, 80286 AT board, 2024 hi-res monitor, 2350 PVA board, as well as the improvements in 1.3 and plans for the enhanced chip set. After Hanover and the Developers Conference, the Comdex press conference was a let down. Commodore seemed to fall back into the hype of "the Amiga is a wonderful computer, honest." The company skimmed over the new product announcments and spent most of the time relaunching the Amiga.

The conference was more interesting for what it did not mention. Commodore did not describe the A2500s, the bi-sync monitors, the Transputer, the A500 hard disk controler, 1.4, or even a lot about 1.3. The main reason for the omissions was that Comdex is where companies make announcements about products that they are pretty certain will be released (companies that have had trouble with the Federal Trade Commission that is). While this does not mean that the A2500s, monitors, low-end genlock, and so on are never going to ship, it does mean that Commodore was not sure enough about their configurations, dates, or viability to talk about them at Comdex.

The second room held the dealer luncheon and conference. Commodore turned the third room into a mini-exhibition hall for developers, providing over 75 Amigas. Developers finally had a location that was big enough to properly demonstrate their wares to dealers, distributors, and the press.

There was plenty to demonstrate. Future Touch showed off an Amiga touch screen; ASDG had a do-everything board for the A2000; Mimetics ran a 3-D modeling program; Epyx played a handful of new games; Haitex Resources proudly wore their high-tech 3-D glasses; Discovery Software rode their wave of hot products, and on and on (for complete descriptions see What's New? in this and upcoming issues).

Not only were there three times the number of Amiga developers at this years Comdex than at previous shows, but just about all of them were in one of the three rooms on the first day. In the shadow of an IBM-obsessed, somewhat stale show, Commodore managed to prove that the Amiga does exist, it is big enough to attract some attention at Comdex, and Commodore can occasionally do things right. *—GSW*



Who's in the Envelope?

THE AWARDS WILL not be presented until November, but Aegis Development is now accepting entries for their second annual Desktop Video Contest. You can enter as many videos as you like as long as they run no longer than five minutes and were created on the Amiga with at least one Aegis product. Desktop video professionals not associated with Aegis or Commodore will judge the videos for the best animation, special effects, computer and software use, artwork, creativity, editing, story line, sound, and overall quality and ingenuity.

Submit your masterpiece on ½-inch videotape to either the amateur (not created for pay) or the professional (created for pay) category. You will also need an official entry form, which you can find at any Amiga or Aegis dealer. The deadline is September 1, 1988. Aegis will announce the winners later that month, but will present the awards at the fall Comdex in Las Vegas, NV. Prizes range from an A2000 to gift certificates. For more information, contact Aegis Development Corp., 2115 Pico Blvd., Santa Monica, CA 90405, 800/345-9871 (in California dial 213/392-9972).

—LJB

ILLUSTRATED BY MACIEK ALBRECHT

HORS D'OEUVRES

Hints, tips, and techniques

from your fellow Amiga users.

De-Arc De-Zoo in RAM

TRY THIS METHOD for extracting Arc or Zoo files. When downloading from a BBS or an on-line service, download the file to RAM (if you have enough memory). Then, when done, de-Arc or de-Zoo the file in RAM. After you have extracted it, run it, and if you like it, copy the file(s) to a disk with a DIR utility or the regular COPY command. If you don't like it, simply warm boot the system, and it's gone.

Ryan Kucharski
Fairborn, OH

Editor's Note: You might want to save the Arc or Zoo file to a temp file before you run it. That way, if something goes wrong, you still have a copy of the program.

C Commands on 5.25″ Drives

I FOUND A good use for the 5.25″ drive in the quest for more working RAM space. If you are using a RAM disk for commands to free up your 3.5″ disk drive, do basically the same thing to your 5.25″ drive (you don't really need a subdirectory called C), then ASSIGN SYS:C to DF2:. Or, you might want to use it for an add-on to your SYS:C directory, as I do. Put extra commands, such as DIRUTIL or other public-domain commands (or things like TxED), on the 5.25″ drive and put a PATH command in your startup sequence to direct AmigaDOS to the extra commands. It is by no means fast, but it does give you a place for all that stuff that doesn't fit on your Workbench. (Note: This only works under AmigaDOS 1.2.)

To Mr. Al Willen of Riverdale, NY, who had the tip about the 5.25″ drive stealing 30K [Hors d'oeuvres, July/August '87, p. 16]: It's true, but if you are going to turn it on no matter what, then you might as well use it for something. Right?

Steven Johnston
Lacey's Spring, AL

PATH Speedup

I HAVE SEEN many tips from *AmigaWorld* readers aimed at speeding up the execution of AmigaDOS commands and freeing the user from the need to have the Workbench disk inserted at all times, but I haven't seen the following method mentioned.

This method speeds execution while conserving RAM. The key is the PATH command, which controls the order in which AmigaDOS searches directories for commands. (This command is available only in version 1.2, but I'm assuming anyone who is interested in speed has made the switch.) Insert the following lines into the startup sequence:

```
makedir ram:c
path add ram:c
copy c:copy to ram:c
copy c:delete to ram:c
.
.
.
```

This makes AmigaDOS check in RAM for commands before searching on the disk. The only restrictions on the placement of these lines in the file is that the MAKEDIR and PATH commands should come before any other PATH commands in the file. Copy only the commands you use most often, with COPY as the first, to speed things up. With the proper choice of commands, you can eliminate over 80% of your disk access for commands, and only use up 25–35K of precious RAM. Also note that this works just as well for any executable file you use often, not just AmigaDOS commands. The partial RAM DOS will be activated after you do a warm or cold reboot.

John Johnson
Ithaca, NY

Editor's Note: I'm not sure if we have published this tip in the past, but even if we have, not everyone has all of our back issues.

Faster Marauder II

ONE OF THE most noticeable features of Marauder II is its scrolling rainbow background. This background creates an impressive display, but is unnecessarily taxing on the CPU. You can speed up the disk backup process significantly by pushing the Marauder screen behind the Workbench screen. Do this by holding down the left Amiga key and pressing the N key, once the process has begun. You will hear the drive(s) speed up as soon as the Marauder screen is hidden. To return the Marauder screen to the front, hold down the left Amiga key and press the M key. With a single drive and 1MB of RAM, I was able to reduce Marauder's backup time from 4 minutes, 12 seconds to 2 minutes, 55 seconds (in analytical mode, verify on).

Erik J. Palm
Rockford, IL

CLI or Workbench or Both

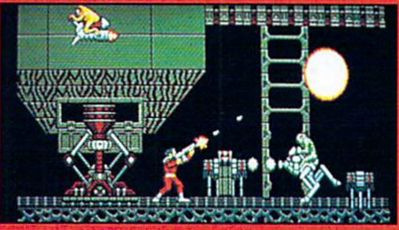
IF YOU USE the CLI as much, or more than Workbench, try adding these lines to your startup sequence:

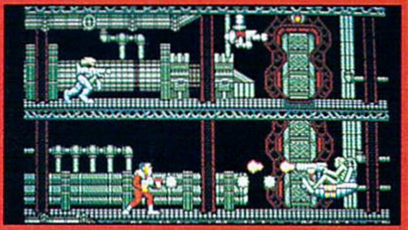
```
date ?
loadwb
date ?
endcli > nil:
```

This lets you do the following: load ►

OBLITERATOR









OBLITERATOR

Obliterator is a new and very exciting product from Psygnosis, which takes full advantage of the features of the Commodore Amiga and Atari ST, whilst supporting the full range of 68000, 68010 and 68020 processors.

When compared to Psygnosis's previously released animated graphic adventure - Barbarian, the player will find over 100 separate locations within the products three-dimensional play-field. The effect of the detail and complexity of the graphics must be seen to be fully appreciated.

Two other features which Psygnosis have added to this product are a "Save Game" facility and stunning music and amazing sound effects.

All this should combine to make for yet another award winning product from Psygnosis.

OBLITERATOR — $39.95

Other Psygnosis Titles

Terrorpods	— $39.95
Barbarian	— $39.95
Deep Space	— $39.95
Arena	— $39.95

All available for 512K Colour, Atari ST, Commodore Amiga.

PSYGNOSIS
1st Floor Port of Liverpool Bldg.
Pier Head,
Liverpool.
L3 1BY.
United Kingdom.
Tel. No. 011 44 51 236 8818
Fax. No. 011 44 51 207 4498

PSYGNOSIS

only the CLI (by entering "A" at the date prompt); load the Workbench, and keep the CLI (by pressing Return at the first date prompt and then entering "A" at the second); or load the Workbench and get rid of the CLI (by pressing Return at both prompts).

Matthew L. Jones
Reno, NV

Unstuck With ASSIGN

I OFTEN USE the RAM: disk to store my frequently accessed commands. If you delete the commands stored on RAM: before reassigning C: to SYS:C [see info.phile, p. 63, in the April '88 issue of *AmigaWorld*], there is a way to get unstuck. Place the disk you booted with in any drive (let's say DF0:). Then enter the following from the CLI:

```
DF0:c/assign c: DF0:c
```

This allows access to the ASSIGN command by specifying the complete path. Now you have access to the commands in the C directory of your boot disk.

This technique can also be used to force AmigaDOS to search only the specified directory when looking for a command.

Steve Bakarich
Allen, TX

Quicker Startup

IF YOU ARE used to entering the date and time during your startup sequence, try this. Rename your startup sequence as "Rest", then create a new startup sequence with these lines:

```
RUN EXECUTE s/Rest
Date ?
ENDCLI
```

This lets you enter the current date and time while the rest of your startup sequence is executed.

Petter Urkedal
Vatne, Norway

Cure for Ailing Mice

I RECENTLY DISCOVERED a mouse cure that may be helpful to others. When I clicked on an icon, it acted as if I had double clicked it, and when I used sizing gadgets, they wouldn't always work smoothly. It was as if the computer was receiving the wrong number of mouse-button clicks. I opened the mouse to see if it was a dirty switch.

To do this, turn the power off and disconnect the mouse from the computer. Remove the two screws on the bottom where the cable comes into the mouse. This will expose two wafer switches. The switches consist of a dome-shaped piece of metal with a dimple in the center held over a C-shaped printed-circuit trace with tape. The dimple of the upper contact should be centered so that the mouse button hits it—mine was off center. (You should notice marks on the tape where the mouse button is making contact.) I removed the tape, recentered the contact on the trace and replaced the tape. I haven't had any problems with misinterpreted mouse clicks since.

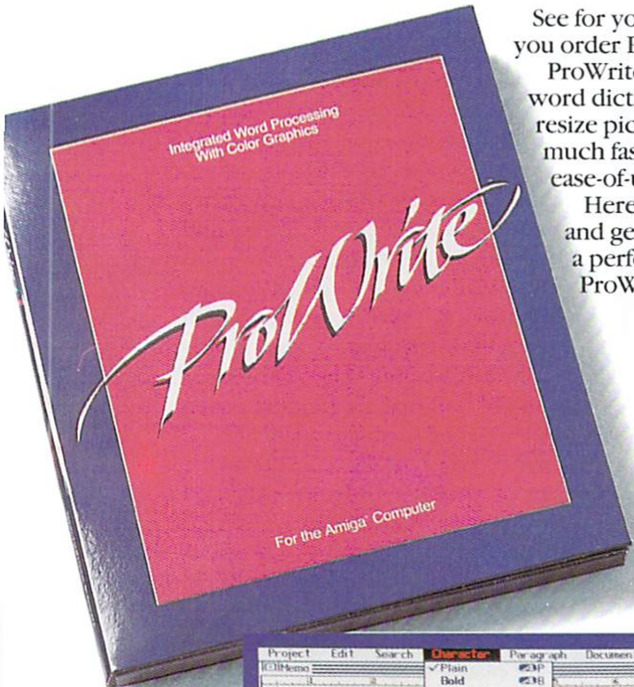
Mark A. Olsen
Höfn AFS Iceland

If you have an idea you'd like to share with our readers, send it to Hors d'oeuvres, Amiga-World *Editorial, 80 Elm St., Peterborough, NH 03458. If your idea gets published, you'll receive an* AmigaWorld *surprise gift.* ■

It's Time To See How Your Word Processor Stacks Up To ProWrite™ 2.0

Feature	ProWrite	Scribble	TextCraft	VizaWrite	KindWords	LPD Writer
SPELLING CHECKER	✓	✓			✓	✓
MAILMERGE	✓	✓		✓	✓	✓
OPEN MULTIPLE DOCUMENTS	✓	✓		✓		✓
TRUE MULTIPLE FONTS	✓			✓		
INCLUDE COLOR GRAPHICS	✓				✓	
PLACE GRAPHICS ANYWHERE ON THE PAGE	✓					
USE COLOR FONTS	✓					
WYSIWYG DISPLAY	✓		✓	✓	✓	✓
USER-SETABLE PREFERENCES	✓					
LEFT, RIGHT AND DECIMAL TABS	✓			✓		
PARAGRAPH SORTING	✓					
CHARACTER, WORD, LINE, AND PARAGRAPH COUNTS	✓					
FAST GRAPHICS PRINTING	✓			✓		
USE ANY PREFERENCES PRINTER	✓	✓	✓			✓
AUTOMATICALLY CONFIGURES TO PRINTER	✓					

Now You Can Trade Up To ProWrite And Save $50



See for yourself—trade in your current word processing software, and get $50 off when you order ProWrite, the only multi-font color graphics word processor for the Amiga®!

ProWrite 2.0 has a number of powerful new features. A spelling checker with a 95,000-word dictionary. Mail merge. The ability to read hold-and-modify (HAM) pictures, and to resize pictures as well. In addition, ProWrite has the Workbench 1.3 printer drivers, for much faster and higher quality graphics printing. All this, plus ProWrite's flexibility and ease-of-use combine to make ProWrite the best word processor for the Amiga.

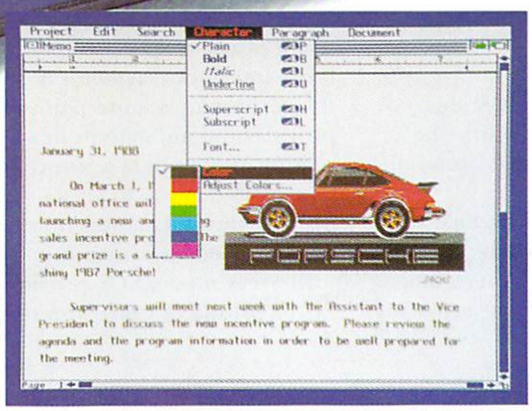
Here's the offer: just send us the master disk of the word processor you're using now, and get ProWrite, version 2.0, for only $75! That's a savings of 40%—which makes this a perfect time to reconsider your word processor. Because now, when you compare ProWrite and the competition, it really pays!

CALL FOR A FREE BROCHURE ON PROWRITE AND FLOW™, THE IDEA PROCESSOR FOR AMIGA.

New Horizons
S O F T W A R E

First In Personal Productivity And Creativity.
P.O. Box 43167 / Austin, Texas 78745 / (512) 328-6650

ProWrite is a trademark of New Horizons Software, Inc. Amiga is a registered trademark of Commodore-Amiga, Inc.
Circle 38 on Reader Service card.



AW

I'M READY TO MOVE UP TO PROWRITE 2.0!

Here's my word processor master disk and a check or money order for $75 payable to New Horizons Software, Inc. Send me the new ProWrite 2.0! (Texas residents please add $6 sales tax).

NAME ____________________

ADDRESS ____________________

CITY ____________ STATE ________ ZIP ________

Keyboard Controlled Sequencer

Music to a MIDI maestro's ears.

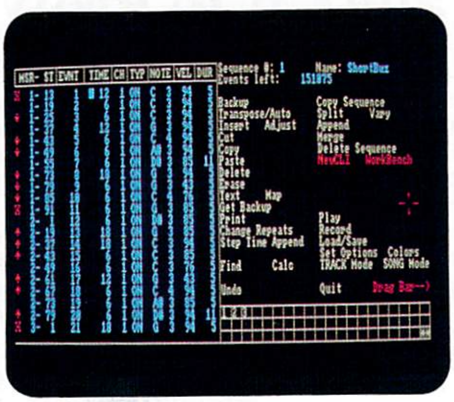
By Bob Lindstrom

THE DOCTOR IS in, and suddenly professional MIDI music is alive and well on the Amiga. Dr. T's Keyboard Controlled Sequencer (KCS) turns the Amiga into an outstanding MIDI-controlling computer, whether you're producing your first album or slapping together a musical demo for the local users' group.

At the outset, the Amiga was troubled by some faulty attempts at MIDI products. In KCS though, Amiga musicians have a recognized industry-standard MIDI sequencer.

For those not familiar with MIDI (Musical Instrument Digital Interface), a sequencer turns your computer into a multi-track tape recorder, recording notes played on a synthesizer or entered one by one in a step-time editor. You can then cut and paste those building blocks of rhythm, harmony, and melody into a full-blown composition. Sequencers will transpose keys, alter rhythm, and recombine individual parts too, and if your fingers betray you with a few clinkers, you can edit individual notes and fix your flubs. Once your masterpiece is complete, the sequencer plays it through your MIDI instruments. With a few synthesizers, it's like having a backup band on 24-hour call.

KCS is a 48-track sequencer with real-time recording, a step-time note editor, and the ability to create up to 128 separate sequences. It works with any MIDI port that attaches to your serial port. Program operation is swift and efficient, making the most of the Amiga's processing muscle. In addition to the cut-and-paste functions that make KCS the equivalent of a musical word processor, the program has dozens of advanced features, detailed in the 278-page manual. Virtually all desirable MIDI functions are included: the ability to quantize during or after recording, punch in/out with an undo option, audible and visible metronome, song pointers, sync to internal or external clock, and a separate program to convert



Open Mode's flexibility incites creativity.

KCS files to the MIDI file standard that several other publishers use.

With large windows to display information, KCS is terrific for the MIDI-oriented composer or performer. But KCS displays music only as MIDI data; it does not deliver standard musical notation.

The Doctor Will See You Now

Versatility is the keynote of KCS; this program allows you to write music the way you want to. Three systems are available for composing.

The Track Mode is a 48-track tape recorder with continuous overdub. Just choose a tempo and MIDI channel, and the program records synthesizer input in real time. The length of the first recorded track determines the length of subsequent MIDI tracks. If the initial track is eight measures long, later tracks will be eight measures as well. Even within this seeming limitation, KCS offers versatility. When using continuous overdub, the Track Mode is prepared to record a new track the instant one is finished. If you want to record a 24-measure solo, KCS will create three consecutive eight-measure tracks to contain the entire piece.

Moving to the Open Mode, a highly-flexible environment for joining and altering fragments, you can combine those tracks into one continuous solo. You can then go on to produce entire scores, writing control sequences that trigger other sequences. KCS allows you to creatively alter sequences to add variety to a composition; you can transpose and mute sequences, change tempos instantly or gradually, transmit patch-change information to MIDI instruments, and even add an element of randomness in pitch and rhythm. The RA command, for example, will make a random choice from a list of specified sequences.

When you first write a control sequence, you will probably instruct the computer to initiate a group of sequences and wait until all are completed before moving to the next set. With experience however, you can create an Open Mode control track that begins sequences at any specified point, and then layer and stack fragments at will. While this technique is more painstaking, it provides the ultimate in flexibility.

Song Mode offers a less complex way to assemble music in verse- and chorus-like structures. Even beginners can quickly assemble scores in this manner.

In every mode, KCS provides a full array of editing options. You can accom-►


ONE GREAT GAME
DESERVES ANOTHER
ARKANOID
TAITO
33 NEW LEVELS
DISCOVERY SOFTWARE INTERNATIONAL
ZOOM!
DISCOVERY SOFTWARE INTERNATIONAL
A NEW CHALLENGE
ARKANOID
• The best just got better
• Reviewers agree: unparalleled arcade quality
• Upgraded to 66 knockout levels!
• Twice chosen as arcade "game of the year"
• 30-day unconditional money- back guarantee
ZOOM!
• At last, a dynamic new game concept
• A mesmerizing combination of action and strategy
• 50 levels. 1-2 players or 2 players at once
• She'll love it too, so will the kids!
• 30-day unconditional money-back guarantee
Circle 89 on Reader Service card.
DISCOVERY SOFTWARE INTERNATIONAL
Discovery Software International products are available at your favorite retailer.
Call 1-800-34-AMIGA for details. Arkanoid, $29.95. ZOOM! $29.95. Prices may vary.
Discovery Software International, Inc., 163 Conduit Street, Annapolis, MD 21401. 301-268-9877.
Arkanoid and ZOOM! are compatible with any Amiga™ model. Amiga™ is the registered trademark of Commodore-Amiga, Inc.
Taito® and Arkanoid® are registered trademarks of Taito America Corporation. ©1987 Taito America Corporation.
All rights reserved. ©1987 Discovery Software International, Inc.

plish virtually any MIDI track or sequence alteration, from simple note correction to adding crescendo/diminuendo and special effects. Best of all, when you finish an edit and hit the Return key, the cursor goes precisely where you'll most likely need it. Obviously the developers heeded MIDI users' suggestions.

A General Practitioner

The numerous keyboard and mouse control options also reflect an effort to accommodate the work habits of composers. The program eschews pull-down menus and puts most features on screen where you can access them via mouse clicks or keystrokes. Unfortunately, keystrokes are rarely logical, so beginners will be glued to the manual. Frequent use will teach efficiency though, and help screens are available for some of the more complex operations.

As a nod to multitasking, KCS includes menu items that transport you to Workbench or a new CLI window. From that point, you can open as many additional programs as RAM allows. You will not however, want to multitask while listening to a sequence. The time-sensitive nature of MIDI dictates that rhythmic glitches will occur if you run another program while replaying.

On start-up, the program asks how much memory you wish to allocate to the program. A 512K Amiga has room for a maximum 16,000 note events (which Dr. T's defines as a six-byte entry). One megabyte of RAM will accommodate aproximately 60,000 note events, and three megs can store about 300,000. To bring these totals into perspective, I composed a four-and-a-half-minute piece, making extensive use of a few tracks. It occupied only 4K of RAM. Unrestrained use of a pitch bender or lengthy multitracking will eat memory quickly, but with a little compositional tidiness, the 16,000 note events of an unexpanded A500 can go a distance.

I was surprised to discover that the manual covers both the Amiga and Atari ST. While otherwise good, the documentation is geared for the Atari. Where references are made to the seven keys not identical on the ST and Amiga keyboards, the manual cites Atari labels. A chart is provided to translate the names for Amiga users. Notes, explaining special Amiga applications, are sprinkled throughout. Dr. T's promises an Amiga-specific manual shortly, however.

The keydisk copy-protection scheme is no more irritating than others like it, but there is one fault. When booting a KCS copy, the program requests insertion of the original disk. If you replace the working copy with the original, the drive spins, the screen goes blank, and the program seems to hang. In fact, KCS is waiting for reinsertion of the working copy. Because there is no requester to explain the situation though, you might incorrectly conclude that the program has failed.

I was able to crash the program only once—by trying to write to a reserved sequence (KCS saves a few sequence positions for its own use). The system required a warmstart for recovery.

Final Diagnosis

The ultimate test of a musical tool is whether it stands in the way or makes creative juices flow. KCS freed me from constraints imposed by other Amiga MIDI programs. In fact, preparing this review took much longer than expected because each writing session turned into a new piece of music. KCS creates that kind of inspirational excitement. Dr. T's is now working on a significant feature they plan to add to 1.6: the ability to play through the Amiga's speakers. This would effectively provide a four-voice multi-timbral synthesizer, and allow you to get started with only one external synthesizer. It looks as though KCS will continue to be Dr. Feelgood for MIDI composers at every level.

Keyboard Controlled Sequencer 1.6
Dr. T's Music Software Inc.
220 Boylston St., Suite 306
Chestnut Hill, MA 02167
617/244-6954
$249
512K required.

Source Level Debugger

The C programmer's pain reliever.

By Jim Fiore

I THOUGHT I'D be sprinkling printf( ) and ifdef DEBUG throughout my code till raisins rule the planet. Fortunately though, the folks at Manx Software have provided a C interpreter with an interactive editor for spotting errors and massaging data: the Source Level Debugger (SDB).

A full-featured C source-code debugger, SDB allows you to trace through a program—line by line, function by function, or however you desire—while it executes. You can examine or alter variables and constants at any point during the process.

SDB, which tips the scales at 90K, works only with the most recent release of the Manx Aztec C compiler: version 3.6 (you can't use it with the Lattice compiler, either). The program disk contains a useful demo, actually three separate units, each of which walks you through a debugging session with a different program, via a command file.

A File to Debug

To use SDB, you must create a debug file (using the Aztec compiler), by compiling and linking with the SDB options -n and -g, respectively. Unfortunately, you must recompile older (pre-3.6) object files in order to create debug files. The small increase in the compile/assemble/link cycle time will vary with program size. I wrote a program that opens a screen and two windows, attaches a short menu, sets up a variety of boolean and proportional gadgets, and does the typical IDCMP processing. The normal cycle took approximately 2 minutes, 22 seconds, and produced an executable file of 18656 bytes. With SDB, the cycle took an extra 16 seconds and produced a debug file of 20032 bytes (the executable size was the same).

Once you've created the .dbg file, you can start SDB. The easiest way is to enter SDB followed by a space and the program name into the CLI. If your program uses command-line arguments, list them after the program name as usual. Options let you start in assembly mode, set up colors, and more. Invoking SDB opens a full-size, three-part window. The uppermost section shows your C source, and the bottom portion displays SDB output; both have scroll bars and arrows for easy viewing. Separating these parts is a single command-entry line, which you can reposition. Moving the command line up shrinks the source file segment and expands the output section, and vice versa (all proprotions remain ►

City Desk 2.0
POWER & *FINESSE*

Shipping August 1988

City Desk

Desktop Publishing for the Amiga

- Supports PostScript
- Supports HP LaserJet
- Supports 24-Pin Printers
- Supports WordPerfect
- Supports Scribble!
- Typesetting Commands
- Full-Screen Text Editor
- Supports JetSet Laserfonts
- WYSIWYG Screen Display
- Automatically Flows Text
- Supports All IFF Graphics
- Converts Color Graphics
- Not Copy Protected!

Hardware Requirements
Amiga 500, 1000 or 2000 w/512K. Because of the power of this program, we highly recommend at least 1 Meg of Ram.



MicroSearch

This Is What Critics Said About City Desk 1.1

"...the best desktop publishing package for the Amiga." Guy Wright, Editor, AmigaWorld, 12-87.

"...simple enough to satisfy the needs of the causal or beginning user, City Desk has all the power, controls, flexibility and laser capacity that a serious user will want, sooner or later." "...in many ways, the most powerful and flexible program to yet hit the Amiga market." Gary Ludwick, AmigaWorld, 12-87.

With City Desk 2.0, you can create great looking newsletters, brochures, flyers, resumes, catalogs, menus, advertisements and business forms. City Desk comes standard with a custom HP LaserJet printer driver and a custom PostScript printer driver. In addition, we support the NEC and Epson 24-pin printers! We support Amiga preferences printers for dot-matrix output. **City Desks' standard features include: no copy protection, automatic kerning in PostScript, movable toolbox, outline any text or graphics, copy tool which works with both text and graphics, open as many pages as memory allows, and over 50 typesetting commands!** Owners of City Desk version 1.0 and 1.1 are eligible for an update to version 2.0. Simply send us your original program disk, your manual and a check for $35.

New Features for Version 2.0!

- **Supports 24-pin printers! (NEC & Epson)**
- **Hyphenation routines**
- **Text flow around irregular graphics!**
- **Full-screen, sizeable, text editor**
- **New graphics editor**
- **Stamp Objects to Background**
- **Default even/odd pages**
- **Pattern filled boxes**
- **Gray scale support for 16 shades of gray**
- **Print multiple copies**
- **Delete/insert/move pages**
- **Append to a Project**
- **Rulers and x, y, coordinate display**
- **PAL support**
- **Scalable PostScript fonts & HP font utility**
- **Movable columns**
- **Improved magnify tool**
- **New manual in a 3 ring binder**
- **Free newsletters and technical support**

At only $199.95, the power, flexibility and value of City Desk all add up to make it the finest desktop publishing package for the Commodore Amiga... Period!

Perfect Sound

#1 Selling Audio Digitizer



Perfect Sound is the only audio digitizer for the Amiga which can digitize both channels simultaneously. Record in mono or stereo, then use the editor to modify the sound. Delete, insert, graph or flip recorded sound.

City Desk Art Companion

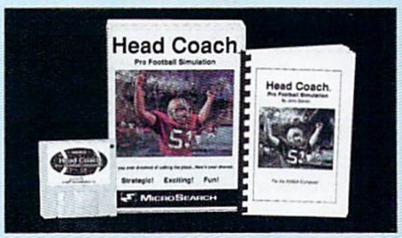
Desktop Publishing Art Vol. 1, 2, & 3



Volume 1 contains 200 medium resolution IFF images of people and technology. Volume 2 has 200 high resolution IFF images of banners, borders and more. Volume 3 contains 104 high resolution screens and 104 hi-res brushes for custom pattern-filling your clip art masterpieces.

Head Coach

Pro Football Simulation



This is simply the finest, most powerful football simulation on ANY personal computer. You call the plays against another player or against the computer. Create your own playbooks. It's addictive and legal.

European Distributor
Precision Software, U.K.: (01) 330-7166

Canadian Distributor
Air-Stat: (416) 477-9440

MicroSearch
9896 S.W. Freeway, Houston, Texas 77074 • (713) 988-2818

User groups may be eligible for free software. Call for details.

Circle 27 on Reader Service card.

the same). After creating the window, SDB searches though the source file, finds the part with main( ), loads it, and stops at the main( ) entry point. SDB numbers each line of source, and highlights the present/active line (the one about to be executed).

BEGIN DEBUGUINE

A variety of commands will start the debugging process. If you have used Manx's assembly debugger (db), many of these will be familiar. With the single-step (s) option enabled, SDB will execute the present/active line and halt at the next line. If the present/active line happens to call to one of your own functions, SDB will step into the source for that function. The t command operates the same way, but treats your function call as a single line.

To execute a segment of code, use one of the g (go) command variations. Essentially, go sets a temporary breakpoint; if you specify a line number or function, SDB executes until it reaches that point or an associated return. You can also set, clear, display, and reset permanent breakpoints. The breakpoint-set command lets you specify skips (the number of times SDB is to bypass the point before breaking), and indicate a list of SDB commands to be transacted upon the break. Using this feature, you can zip through the middle 498 iterations of a 500-count loop. The c command centers the present/active source line in the display, while df shows you the contents of the source file. A string-search command is helpful for locating every occurrence of a specified function.

When SDB comes across an illegal instruction during execution, it stops and displays the contents of the Amiga address and data registers. If your program does something very bad (like closing a window after closing its screen), Mr. Guru will visit; running a program in SDB doesn't insulate you from fatal errors.

SDB provides a number of memory-display options. You can examine any memory location in hex and modify the value, and display auto variables and all code and data symbols. SDB also lets you evaluate normal C expressions right on the command line. For example, you might have SDB evaluate ptr = array_of_struct[0] + 1 in order to check the address of the second structure in the array (yes, SDB does pointer math). You can redirect the input/output of the SDB command line to another file, allowing for convenient macro definition or a debug session log.

JITTERBUGGING

Perhaps the most attractive feature is the formatted-print command. You can print just about anything including arrays and structures. If my_window is a pointer to a window structure for instance, by issuing a single command you can print all the fields in a structure, with their labels! You can also directly investigate strings. If you'd like to see the starting address of the string in element [0] of an IntuiText array called my_text, you might enter p my_text[0].Itext. This will produce the response unsigned char *IText = 0 x 0. . .some address. The command p *my text[0].IText will yield the ASCII value of the first character. The real fun begins when you use ps instead of p—in the last example, the output will be the actual string!

There are a few inconsistencies in the print command. Let's say you've declared an array of integers called color_table. As expected, if you enter p color_table[0], SDB will give you the value of element [0] (by the way, you can get this in either hex or decimal, and it's also possible to print in octal, or convert floats and doubles), and entering p &color_table[0] produces element [0]'s address. But when you enter p color_table (note that without the subscript this indicates the head of the array), SDB delivers the value of element [0] instead of the expected address. Evaluating with e color_table will yield the address, as will printing or evaluating color_table, strangely enough (the exact output is (*color_table)[0] = . . .address). While you might think this is SDB's way of indicating a pointer to a pointer, if you go back to the preceding example using my_text, and insert p my_text[0].IText, SDB responds: unsigned char **IText = . . . address (note the **), just as it should. I've stopped referring to arrays in this fashion with SDB; after all, you can get the desired results in other ways.

Other features include a nice on-line help facility, the ability to move up and down the call frame (to see who called what and to investigate local variables that would otherwise be hidden), and the command-line history. SDB also has provisions for testing device drivers and libraries. The short manual is logically laid out and contains most of what you need to know. Experience with Manx db may quicken the starting pace.

My favorite trick is using SDB to optimize the look of windows. With the help of SDB's memory modify commands, I can open a window, verify positioning, close the window, modify the positioning values, reopen the window, and so on. When I finally get the values I like, I just jot them down, and stuff them into the source. This may not be the quickest route, but it's faster than guessing and recompiling, and it saves the cost of a layout program.

SDB is a valuable development tool and instructional program for new C programmers—especially considering its price. SDB may not be the perfect Amiga C debugging environment, but it comes much closer than anything else I've seen.

Aztec Source Level Debugger
Manx Software Systems
One Industrial Way West
Eatontown, NJ 07724
800/221-0440
$75
Aztec C version 3.6 (or later) required.

PHOTON PAINT

HAM it up.

By Roger Goode

AS A PROFESSIONAL artist, I can be very demanding of the workability of a graphics program. Photon Paint, A full-featured Hold-and-Modify (HAM) paint program, is simple to learn and use. Photon's developers had the good sense to style their interface after the user-friendly DeluxePaint II (Electronic Arts); many tools operate similarly, and some keystroke commands are the same. For those not familiar with DeluxePaint II, or even with the Amiga, the excellent manual makes no assumptions about your background. It reads like a primer for the novice Amiga artist; tutorials guide you through the most important features, and each menu entry is described clearly and concisely. Even experienced users will find it a valuable reference tool.

The non-copy-protected Photon Paint►



GODZILLA MEETS DAN RATHER
YOU WANT LIVE ACTION, FAST MOTION, AND SPECIAL EFFECTS, AND YOU WANT IT ALL AT ONCE. INVISION™ GIVES IT TO YOU.
YOU'VE GOT IMAGINATION. AND NOW YOU'VE GOT SOMETHING IT CAN RACE WITH. YOU PRESS A KEY, MOVE THE MOUSE AND WATCH THE IMAGE HAPPEN. YOUR CREATIVE POWERS ARE GETTING A WORKOUT LIKE NEVER BEFORE. SOME LIVE ACTION HERE... SOME SPECIAL EFFECTS THERE. MIX IN SOME IMAGES AND YOU'VE GOT SOMETHING WILD AND WONDERFUL. IN VIVID COLOR. THIS IS INVISION—WORKING WITH YOU, YOUR AMIGA, VCR AND YOUR LIVE!™ VIDEO DIGITIZER TO CREATE ANY IMAGE YOU WANT. EVEN GODZILLA AND DAN RATHER. INVISION SOFTWARE FROM ELAN DESIGN. $129. ASK YOUR DEALER OR CALL US: (415) 621-8673.
INVISION™
DEALER INQUIRIES WELCOME.
P.O. BOX 31725 SAN FRANCISCO, CA 94131
Circle 210 on Reader Service card.
NEITHER DAN RATHER NOR GODZILLA ENDORSE THIS PRODUCT. AMIGA AND LIVE! ARE TRADEMARKS OF COMMODORE/AMIGA, INC. AND A-SQUARED SYSTEMS RESPECTIVELY.

disk (which supports overscan and the European PAL standard) offers a full complement of tools, a few that are unique, and all of which operate in a refined manner. The on-screen toolbox has most of the basics—a variety of standard brushes in different sizes, freehand draw, straight lines, curved lines, outline and filled shapes, color fill, fonts, a magnifying tool, and the all-important brush-grabbing tool.

The toolbox itself occupies a fairly large band across the top of the screen. While you can easily move it up or down and toggle it on or off, a smaller toolbox would not be as likely to hinder the flow of creativity. To the program's credit though, the tools operate behind the toolbox. So, if you begin a circle whose dimensions go beyond the boundries of the toolbox, you can draw over the box—without toggling it off—and still achieve a complete circle.

While most standard tools behave as expected, there are a couple of exceptions. The color-fill tool works in three different ways. Flood fill, as usual, changes all adjacent pixels of a given color to the newly-selected color. Free-shape fill similarly floods an area outlined by hand. The unique Boundry fill covers all pixels within an area bounded by a specified color.

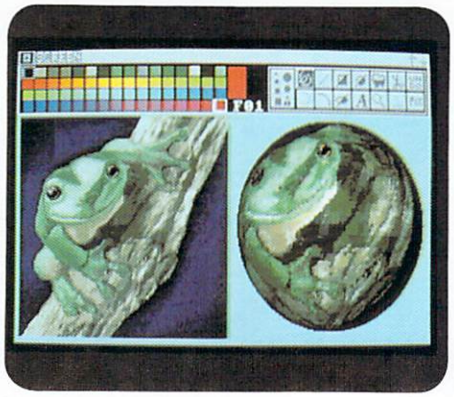
The magnification tool is about the best I've seen. You can position the intuition-style magnification window anywhere on the screen, and size it to any dimension from flea-hair close right up to full-screen size. Gadgets in the window's borders let you size, scroll, and reposition the image, and quickly set minimum, medium or maximum magnification with a click of the mouse.

Another neat and unusual device is the Pix tool; it gives your work a mosaic-like, "pixelized" look. You can change the size of the pixel blocks to suit your needs.

Mixing Paint on the Palette

The most important element of a HAM paint program is the ability to manipulate and display all of the Amiga's 4096 colors. Photon Paint's well-conceived palette holds an impressive 64 basic colors for straightforward operations, and an extended palette for heavy-duty color mixing and selection. The expanded palette displays three Digi-Paint (NewTek) style squares that represent sides of a 3-D cube containing all 4096 colors. As you move the cursor around in one box, the display in all three changes to reflect the field you're in. You can select the 64 colors for your palette by clicking in these boxes, or by manipulating the RGB (Red, Green, and Blue) and HSV (Hue, Saturation, and Value) sliders. Also in the extended palette are gadgets for copying and swapping colors, and for creating color spreads. As you make changes to the palette, none of the colors that are already part of the image are affected.

Until now, working with HAM pictures has involved fighting with the odd shadowing/fringing created by the juxtaposition of some colors. Photon Paint endeavors to minimize this effect, and while the program does not eliminate the problem, it comes close. The Amiga holds 16 colors, which are the basis of all 4096 shades, in 16 registers. Using these base colors, the program attempts the best transitions between those used on-screen. The default palette consists of a carefully-chosen range that should provide the best results in most cases. For paintings that lean heavily to one part of the spectrum, the default palette may not work, so Photon Paint provides options for setting your own base colors. You can conveniently arrange these across the top of the palette, and copy or change them at any time (the manual shows you how to achieve optimal results).


A brush is wrapped to a sphere.

Normally, the program subtly modifies chosen and on-screen colors (only the base colors remain unaltered), thus enabling itself to use more than the standard 32. The Exact Color option lets you override this, however, and gives you just the color you've chosen. I'd recommend using this option sparingly though, because it can induce fringing in surrounding colors. The Base-color menu lets you choose base colors from the current brush or the alternate screen, so you can integrate material from other pictures.

Brushing Up on Basics

Photon Paint's most impressive features are under the Brush menu. Here you'll find all the basics—brush flipping, resizing, bending, rotating—that you take for granted. Keep in mind though, this time they apply to Hold-and-Modify mode.

The Tilt feature is much like Deluxe-Paint's Perspective mode; it even involves the numerical keypad. Tilt has a pleasingly intuitive feel, however. With a brush attached to the pointer, Tilt mode presents a hollow box that you can reposition on various axes with the mouse. It's easy to envision the outcome as you change planes and positions.

Using the brush-twisting mode is sort of like wringing out a printed washcloth. It's difficult to predict the results of twisting; you're working with a hollow outline of the brush, so you can't see the parts being overlapped and compressed. This option's usefulness seems limited.

The surface-mapping feature, "Wrap-on. . . ", spreads a brush onto a three-dimensional shape. When you choose this option from the Brush menu, a submenu appears listing the available shapes. Select one, and the current brush is replaced with an outline of the shape, which you can reduce in size. As the program calculates the new brush, the title bar displays a count-down of raster lines-to-go. This considerate convenience (it appears elsewhere in the program as well) lets you know whether you have time to run to the fridge before the calculation is complete. Usually in a minute or less, the brush reappears with the image wrapped convincingly around the selected shape.

The shapes submenu consists of Tube, Cone, Ball, Ellipse, Free, Cube ¾, and Cube *3. Free allows you to draw the right side of a shape, which the program mirrors to produce a symmetrical form. The two cube selections allow you to choose the orientation of a cube and then, respectively, wrap the brush across three sides, or stamp the complete image on each surface, in proper perspective.

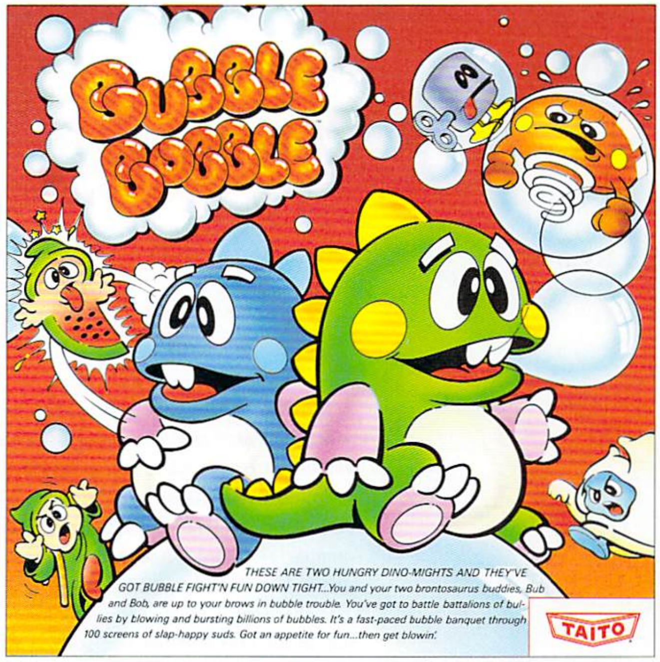
Continued on p. 64

WHAT'S A TAITO®?

That's a very good question. Taito (pronounced Tie-toe) is one of the oldest and biggest names in the arcade industry. We're the world's largest manufacturer and operator of arcade games. Taito's been in the business since 1953.

And that's just the beginning. Taito practically started the video game industry with our classic arcade hit, Space Invaders.™ And over the years, Taito has created more than 1,000 other great action games for arcade and home play.

Now Taito has something equally exciting for you to slip into your home computer. Taito is bringing the same pioneering spirit, technical quality and excitement that made us the arcade leader to your Commodore, Amiga, IBM, Apple and Atari computers. Home computers will never be the same.



BUBBLE BOBBLE: Laugh-packed addictive action. Up to 100 levels of arcade quality play. One or 2 player action. The number one game in Europe three months in a row.

Taito is the arcade leader for a very good reason. We consistently make great video games that bring more action and value to the people who play our games. And literally millions of people play our games in arcades and homes all over the world.

*Our strength comes from the massive development effort we put into creating the kind of games that satisfy the ever-growing arcade appetite and the research gathered from the more than 100,000 arcade machines Taito operates in Japan. (The money in the coin boxes at the end of the day tells you very quickly if you've got a good game or not.) And Taito is always working hard to develop the most exciting action-packed new video games that push the technology to its limits.**

Because arcade games are the benchmark for home video games, Taito's continuing leadership in the arcade industry means that when you buy Taito products you'll know you're getting the most video thrills, mesmerizing arcade quality graphics, spell-binding sound and above all, action!

That's why nobody but Taito can bring you more of what you're looking for in home computer video games. One thing's for sure. You don't get to be the biggest in the arcade business by making run of the mill video games.

When you buy Taito games you're getting more than just fun. We bring you games that test your nerve and your strategy. Taito games will make you laugh and put you on the edge of your seat with adventure, action and excitement. Taito takes you on voyages to places you've never been before–to brave new worlds of imagination and fantasy. After all, isn't that what great video games are all about?

And every action game we put our name on is more than just competitive confrontation. Taito home video games are all about the values of good triumphing over evil, of being the best you can be. That's what you'll get in a game like Bubble Bobble.™ Soon we'll bring you Arkanoid,™ Renegade,™ Alcon,™ Rastan,™ Operation Wolf,™ Sky Shark™ and Gladiator.™ And we've got even more arcade block-busters coming on software formats for play on your home computer. Taito's home-bound hit parade of video fun has just begun.

Who but the arcade leader could bring you so much? That's Taito! Aren't you glad you asked?

Buy Taito products at leading computer stores everywhere. If no stores are near you, Visa/MasterCard holders can order direct from anywhere in the U.S. by calling toll free 1-800-663-8067.

TAITO®

Taito Software Inc., 267 West Esplanade, North Vancouver, B.C., Canada V7M1A5. Tel: 604-984-3344. Taito,® Arkanoid,™ Renegade,™ Alcon,™ Rastan,™ Bubble Bobble,™ Operation Wolf,™ Sky Shark™ and Gladiator™ are trademarks of Taito America, Inc. Amiga, Commodore, Apple, IBM and Atari are trademarks respectively of Commodore-Amiga, Inc., Commodore Electronics, Ltd., Apple Computer Inc., International Business Machines and Atari Corporation. Advertisement by Qually & Company Inc., (Chicago). *If you think you've got the technical and creative ability to develop mind-blowing video games, write to Taito, Attention: Product Development, at the above address.

Circle 56 on Reader Service card.

BASIC By The Numbers

"You got to move. You got to move. You got to move, child.

You got to move."—K. Richards and M. Jagger

By Bob Ryan

44 Sprites and BOBs

A UNIQUE FEATURE of Amiga Basic is its direct support for animation, making it easy to move objects around in a window. It also provides a tool—the Object Editor—that you use to create objects you want to animate. No other version of BASIC gives you so much in the way of animation tools.

You can manipulate two types of objects (known as graphics elements or GELs) from Amiga Basic—virtual sprites and BOBs. In general, sprites are faster than BOBs. On the down side, sprites have a limited size and a limited number of colors. Although you should be aware of these limitations, you need not be too concerned with the differences between BOBs and sprites: Amiga Basic handles both with the same commands.

In the drawer labeled BasicDemos on your Extras disk you will find a program called ObjEdit. This program lets you easily create BOBs and sprites. It also saves the BOBs and sprites in a form that is understandable by the Amiga Basic animation commands. Use of the Object Editor is explained on page 7-7 of the Amiga Basic manual. For demonstration purposes I'll use the Ball that Commodore provides on the Extras disk.

45 First Steps

THE OBJECT EDITOR saves BOBs and sprites to disk files. Ball is just such a file. To use any BOB or sprite, including Ball, you have to load it into memory. Here's how you do it.

```
OPEN I, #1, "BasicDemos/Ball"
OBJECT.SHAPE 1, INPUT$(LOF(1),1)
```

The first line opens the file Ball, indicates that the program will read from the file, and designates Ball as file #1. The second line reads the description of Ball contained in the file and designates it as shape #1. The INPUT$ statement reads a string that is as long (LOF = length of file) as file #1 from file #1. Because this string is already in a form BASIC can use, that's all you have to do to define an object.

With an object safely defined in memory, you are ready to move it around. You accomplish this by using the many object commands available in Amiga Basic. The simplest command positions an object in the current window.

```
OBJECT.X 1,50
OBJECT.Y 1,50
```

These two lines position the upper-left corner of the object at location 50,50 of the output window. To make the object visible, you use the following:

```
OBJECT.ON 1
```

You're now just about ready to move the ball. First, however, you designate the direction and speed you want to move.

```
OBJECT.VX 1,50
OBJECT.VY 1,20
```

The first statement above indicates that you want to move object #1 at 50 pixels per second from left to right. The second statement tells Amiga Basic to move the object 20 pixels per second from top to bottom of the window. The result is that the object will move in a diagonal path from upper-left to lower-right.

You are now ready to move the ball. But first, lets throw in some background with:

```
LINE (10,70) – (600,90),,BF
```

Now, to get the ball rolling, enter:

```
OBJECT.START 1
```

And, to keep the ball within the output window, a test:

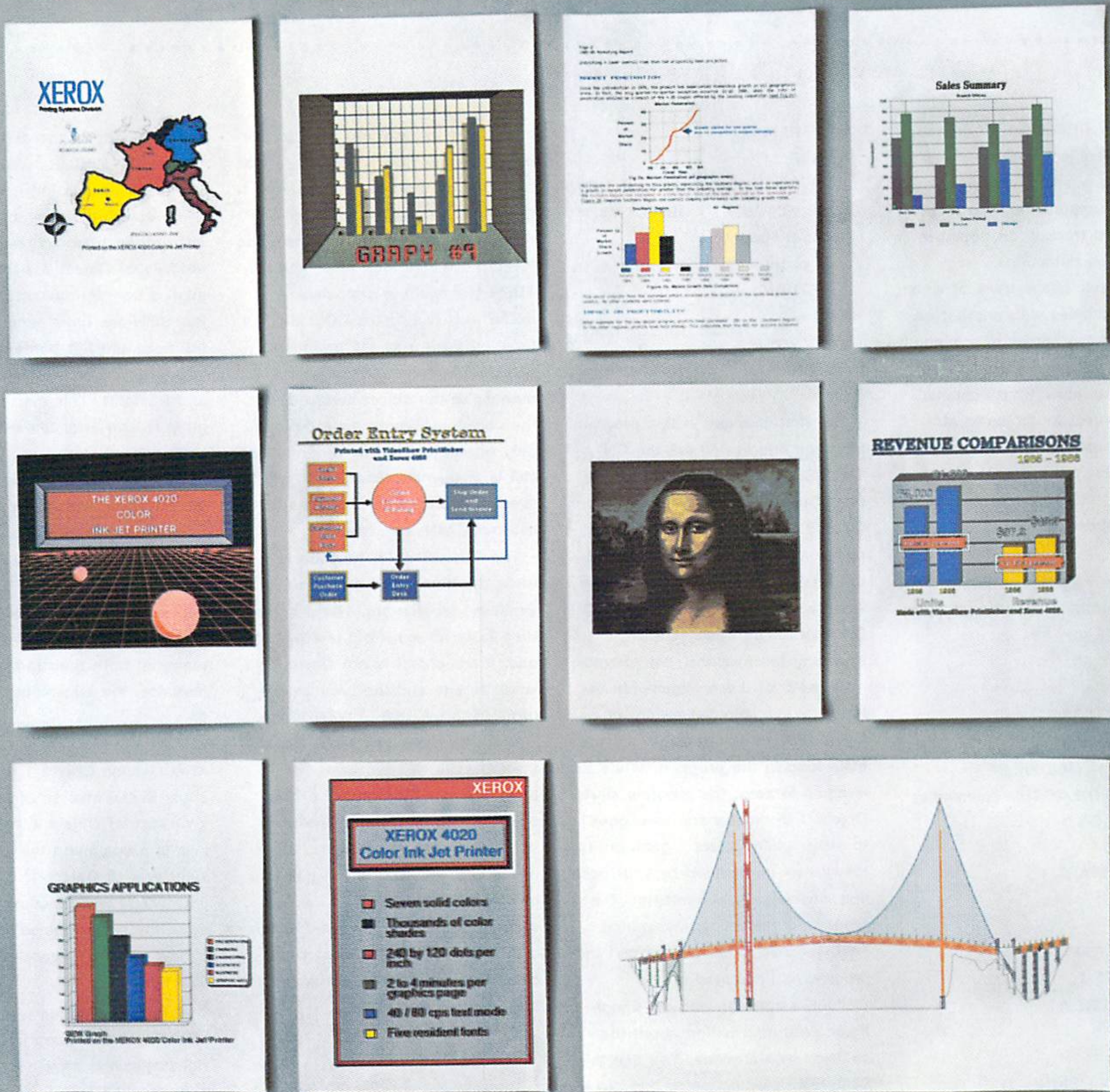
```
WHILE OBJECT.X(1) < 600 AND OBJECT.Y(1) < 160
WEND
```

Once the object gets beyond 600 in the x direction or 160 in the y direction, the WHILE. . .WEND loop ends. The program then cleans up and ends.

```
OBJECT.CLOSE 1
END
```

That's it. Your first animation program. ►

XEROX



The Xerox 4020 Ink-Jet Printer is making headlines with unlimited color.

If you want to make headlines with your next business presentation, try adding color with the Xerox 4020 Color Ink-Jet Printer. The 4020 is a high-quality, attractively priced printer that mixes text with brilliant color graphics. It employs the latest advances in ink-jet technology to deliver seven distinct colors which combine to produce over 4,000 different shades.



But the 4020 makes more than just a colorful impact. It also has a resolution that few color ink-jet printers can match, prints 2 to 3 times faster than comparably priced color printers, and can be installed by just about anyone in less than 10 minutes.

Like all Xerox products, the reliable 4020 is backed by one of the best service and support organizations in the industry: Team Xerox. To learn more about the 4020 Color Ink-Jet Printer, send in the coupon below or call 1-800-TEAM-XRX, ext. 199A.

Team Xerox

We've got a colorful solution to your business needs.

I'd like to learn more about the 4020 Color Ink-Jet Printer and what it can do for my business presentations.

☐ Please send me more information.
☐ Please have a sales representative contact me.

Send this coupon to: Xerox Corporation, P.O. Box 24, Rochester, NY 14692.

NAME ____ TITLE ____

COMPANY ____

ADDRESS ____ CITY ____

STATE ____ ZIP ____ PHONE ____

Or, if you can't wait, call

1-800-TEAM-XRX, ext. 199A.

199A. (1-800-832-6979, ext. 199A.) 999-8/88

46 WATCH OUT FOR THAT TREE!

THAT AIN'T REALLY it, of course. Keeping an object in the window by checking its x and y coordinates is slow and cumbersome. The best way to keep track of an object is with collision detection.

Amiga Basic keeps track of when an object collides with another object or with the border of a window. By handling these collision events, you can determine what happens when an object threatens to stray beyond the confines of the output window. Here's a program that incorporates collision detection into the listing from #46.

```
OPEN I, #1, "BasicDemos/Ball"
OBJECT.SHAPE 1, INPUT$(LOF(1),1)
OBJECT.X 1,50
OBJECT.Y 1,50
OBJECT.ON 1
OBJECT.VX 1,50
OBJECT.VY 1,20
LINE (10,70)-(600,90),,BF
ON COLLISION GOSUB collhandler
COLLISION.ON
WHILE z=0
  OBJECT.START 1
  SLEEP
WEND
COLLISION.OFF
OBJECT.OFF 1
OBJECT.CLOSE 1
END
collhandler:
  wind=COLLISION(-1)
  IF wind <> 1 THEN
    z=1
    RETURN
  END IF
  obj=COLLISION(0)
  IF obj <> 1 THEN
    z=1
    RETURN
  END IF
  ctype=COLLISION(obj)
  IF ctype=-1 or ctype=-3 THEN
    OBJECT.VY 1, -OBJECT.VY(1)
    RETURN
  END IF
  IF ctype=-2 or ctype=-4 THEN
    OBJECT.VX 1, -OBJECT.VX(1)
    count=count+1
    IF count=10 THEN z=1
    RETURN
  END IF
  z=1
  RETURN
```

The first changes in this program from the one in #46 are the ON COLLISION GOSUB statement and the COLLISION ON statement. ON COLLISION GOSUB identifies your collision-handling routine—the routine that does what you want done when a collision occurs. COLLISION ON tells Amiga Basic to start responding to collisions. You should issue both of these statements before you start moving an object.

The next four statements are the main loop in the program. While z is equal to zero, the program starts Object 1 in motion and then goes to sleep while Object 1 goes on its merry way (as defined by your position and velocity statements). The program's "sleep" is interrupted only when an event occurs that the program is interested in.

When a collision occurs, Amiga Basic puts information about the collision into a queue. You use the COLLISION( ) function to find out the window where the collision occurred, the object involved, and what the object collided with.

When this program jumps to collhandler, it accesses the COLLISION( ) function using -1 as an argument. This argument causes COLLISION( ) to return the number of the window where the collision occured. Since this program uses only the standard Output window, this function call is unnecessary. I included it in case you want to expand the program. I test to see that the collision did occur in Window 1. If it didn't, I assign a value of one to variable z. This will terminate the WHILE. . .WEND loop when the RETURN statement is executed.

The next call to the COLLISION( ) function uses 0 as the argument. COLLISION(0) returns the object number of the object involved in the collision. Since I have defined only one object in this program this call is also unnecessary. You will need it, however, in programs that use more than one object.

The COLLISION(0) function returns the number of the object to a variable I labeled obj. The program then tests to see if obj is equal to one. If the object is not Object 1, z is set to one and the program returns to the WHILE. . .WEND loop.

Now you make one more call to the COLLISION( ) function. This time, you use the number of the object as the argument. The function returns the number of the second object involved in the collision or a number that indicates which window border was involved in the collision. The following chart indicates the values that correspond to the four borders:

Border	Value
Top	-1
Left	-2
Bottom	-3
Right	-4

In the example program, this last call to COLLISION( ) will always return a value to variable ctype that corresponds to a window border.

I use a couple of IF. . .THEN statements to test ctype. The first checks to see if the collision was with the top or bottom of the window. If this test is true, I reverse the y-velocity of the object and return to the WHILE. . .WEND routine. If the first test is false, I test to see if the collision was with the right or left border. If true, I reverse the x-velocity of Object 1. I then increment a counter and test to see if ten collisions have occurred with the right and left borders. If ten collisions have occurred, I set z to one and RETURN. This causes the program to end after ten left and right collisions.

The last part of the collision-handling routine ends the program if none of the above tests are true.

Note the way the program reverses the direction of both the x and y velocities. It uses the OBJECT.VX and OBJECT.VY statements in both their forms. For instance, the statement

```
OBJECT.VX 1, -OBJECT.VX(1)
```

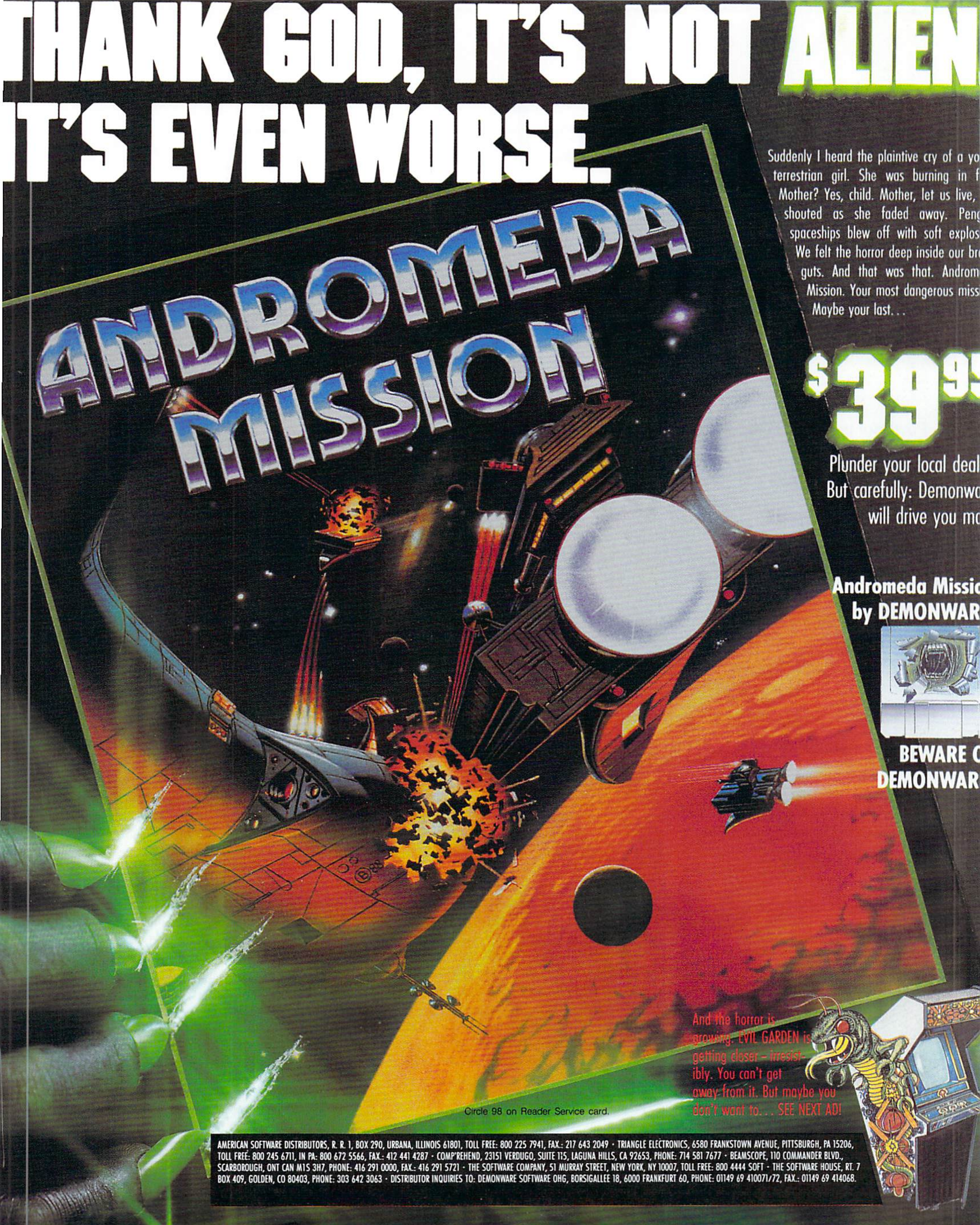
says "assign Object 1 an x velocity equal to the inverse of the current x-velocity of Object 1." OBJECT.VX 1, x is a command that assigns a velocity x to Object 1. OBJECT.VX(1) is a function that returns the current velocity of Object 1. The negative sign changes the direction.

When the program returns to the WHILE. . .WEND loop before 10 left-right collisions have occurred, it goes through the loop again, executing the OBJECT.START statement before suspending operation with the SLEEP statement again. This OBJECT.START is necessary because Amiga Basic issues an automatic OBJECT.STOP command to any object involved in a collision.

Once 10 left-right collisions have occurred, the program exits the WHILE. . .WEND loop, turns Object 1 off, frees up the memory the object occupied, and ends.

47 ON END GOSUB GOODBYE

NEXT TIME, MORE on animation and collisions. Until then, send your questions and comments to BASIC By The Numbers, AmigaWorld, *80 Elm Street, Peterborough, NH 03458.* ■


THANK GOD, IT'S NOT ALIEN
IT'S EVEN WORSE.
ANDROMEDA MISSION
Suddenly I heard the plaintive cry of a yo
terrestrian girl. She was burning in f
Mother? Yes, child. Mother, let us live,
shouted as she faded away. Peng
spaceships blew off with soft explos
We felt the horror deep inside our br
guts. And that was that. Androm
Mission. Your most dangerous miss
Maybe your last. . .
$39.9
Plunder your local deal
But carefully: Demonwa
will drive you ma
Andromeda Missio
by DEMONWAR
BEWARE O
DEMONWAR
And the horror is growing. EVIL GARDEN is getting closer – irresistibly. You can't get away from it. But maybe you don't want to. . . SEE NEXT AD!
Circle 98 on Reader Service card.
AMERICAN SOFTWARE DISTRIBUTORS, R. R. 1, BOX 290, URBANA, ILLINOIS 61801, TOLL FREE: 800 225 7941, FAX.: 217 643 2049 · TRIANGLE ELECTRONICS, 6580 FRANKSTOWN AVENUE, PITTSBURGH, PA 15206, TOLL FREE: 800 245 6711, IN PA: 800 672 5566, FAX.: 412 441 4287 · COMP'REHEND, 23151 VERDUGO, SUITE 115, LAGUNA HILLS, CA 92653, PHONE: 714 581 7677 · BEAMSCOPE, 110 COMMANDER BLVD., SCARBOROUGH, ONT CAN M1S 3H7, PHONE: 416 291 0000, FAX.: 416 291 5721 · THE SOFTWARE COMPANY, 51 MURRAY STREET, NEW YORK, NY 10007, TOLL FREE: 800 4444 SOFT · THE SOFTWARE HOUSE, RT. 7 BOX 409, GOLDEN, CO 80403, PHONE: 303 642 3063 · DISTRIBUTOR INQUIRIES TO: DEMONWARE SOFTWARE OHG, BORSIGALLEE 18, 6000 FRANKFURT 60, PHONE: 01149 69 410071/72, FAX.: 01149 69 414068.

Workstation Amiga

Powerful personal computers, including the Amiga, are reshaping the current scientific/graphics workstation concept. Here we'll discover if the Amiga, with a little tooling up, will join the vanguard of this movement, ready to carry the heavy payloads that will be required of workstations of the future.

By Sheldon Leemon

Up until just a few years ago, the idea of computer workstations brought to mind immediately a system of dedicated terminals connected to a large mainframe host. And people working in the fields of science, engineering, professional graphics, education, and so forth would look to companies such as Apollo and Sun Microsystems for the answers to their high-powered computing needs. Now, however, these same people are turning to more powerful desktop systems that can handle demanding tasks, but offer much greater versatility at significantly lower costs. Apple's Macintosh II, IBM's PS/2 Model 80, and—yes—the Amiga are some of the more popular choices.

With its powerful graphics and multitasking capabilities, the standard Amiga models are already well-suited to many of the demands of a workstation. But what else would you need in order to modify an Amiga so that it could meet all the requirements of a true workstation?

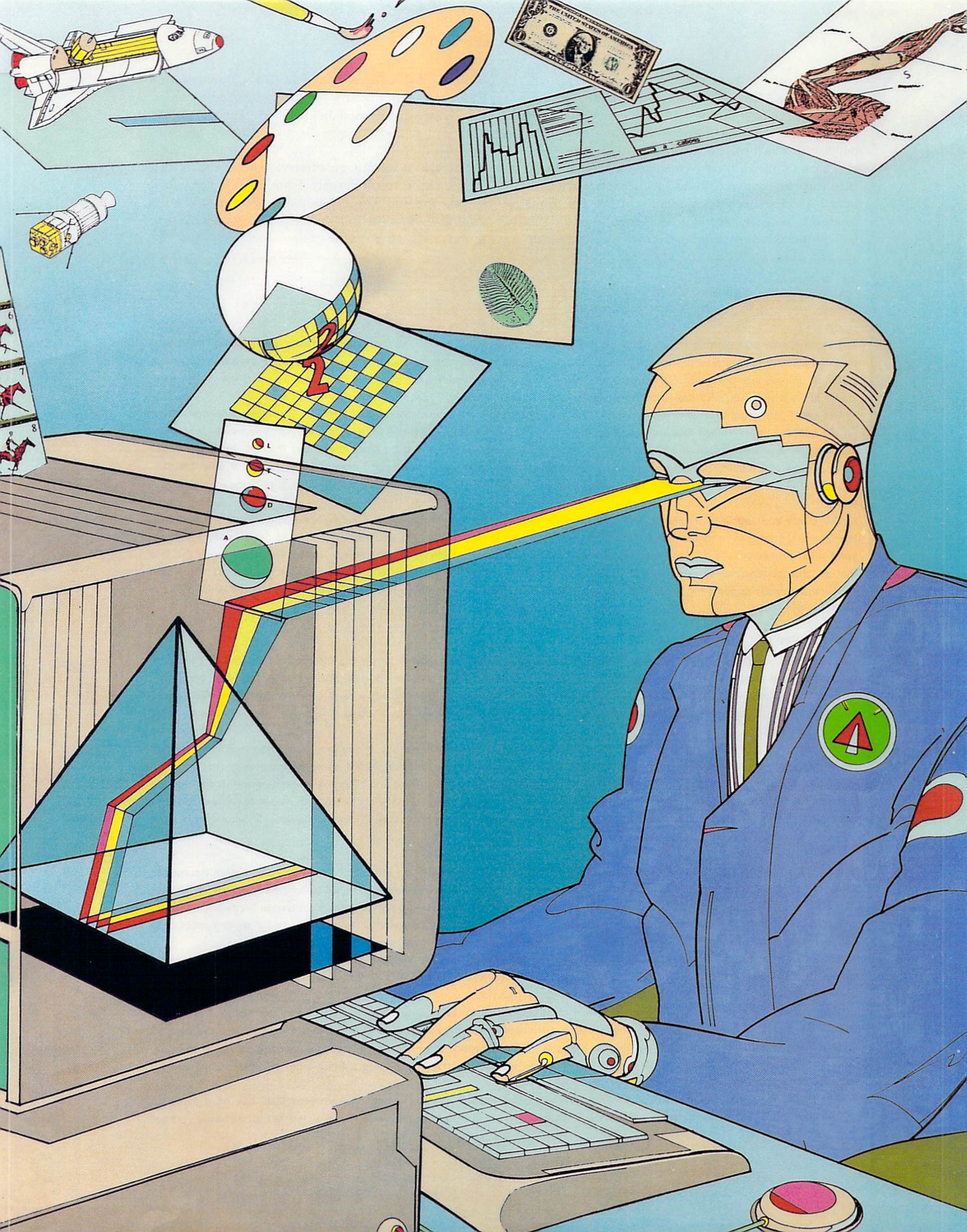
We'll look at three basic areas—dynamic raw computing power, high-resolution display, and networking capability—by which workstations are distinguished from more ordinary computer systems to learn how you can enhance the Amiga to meet those requirements. In doing so, we should get a much more clear picture of how the Amiga stacks up against other workstation solutions.

Accelerators and Coprocessors

The first requirement for a workstation computer is a lot of raw computing power. Current standards demand a 32-bit microprocessor running at a double-digit clock speed and a floating-point math coprocessor chip. Although the 68000 microprocessor used by the Amiga is powerful for a home computer, it is still two generations removed from the 68030—the most powerful member of the Motorola family—and it does not have provisions for directly interfacing to a 68881 or 68882 math coprocessor. Therefore, for compute-intensive applications, it is desirable to upgrade the Amiga to run a 68020 or 68030 processor.

Changing a computer's microprocessor usually requires both hardware and software modifications. Fortunately, the Amiga operating system was designed from the beginning with an eye towards upward compatibility with more powerful Motorola processors. This means that almost all Amiga programs run on machines equipped with a 68010, 68020 or 68030 processor without change. The hardware considerations present a thornier problem. Because neither the 68020 nor the 68030 is plug-compatible with the 68000, you cannot simply drop the new processor into the existing socket—meaning that you will need an interface board. Finally Technologies' Hurricane is a piggyback board that drops into the 68000 socket, and it will run on two Amiga models. (See the accompanying sidebar "Like a Hurricane" for an ►

ILLUSTRATED BY ISTVAN BANYAI



evaluation of this board.) CSA also has a piggyback board for the A500 and A1000 (although the company is about to release a new, less expensive series—the ND-500 and ND-1000—which will accelerate standard 68000s so that they run at 14 MHz). The A2000 also contains a CPU slot for a coprocessor board, and it is in this slot that you would plug CSA's 68020 CPU board or, if it becomes available in the US, Commodore's recently announced A2620 board. This CPU slot makes it possible to override the 68000 chip without physically removing it. (For a discussion of CSA's accelerator board—and of the CSA 32-bit memory boards mentioned below—see "Turbocharging Your Amiga 2000," p. 26, in the February '88 issue of *AmigaWorld*.)

The speed advantage offered by the 68020 and 68030 chips result largely from the higher clock speeds and full 32-bit data path they can use. Integrating these chips into the existing Amiga system, however, dissipates some of the benefits. Because the

Like a Hurricane

THE HURRICANE BOARD from Finally Technologies is designed to make your Amiga computer run faster and smarter. The board contains a 68020 microprocessor, a 68881 math coprocessor, and custom circuitry that lets these chips integrate with your Amiga computer. Finally has versions of the board available for two Amiga models. For purposes of review, I tested the Amiga 1000 model in an A1000 and, with the help of an adapter board, in an A2000.

The 68020 is the big brother of the Amiga's 68000 microprocessor. With minor exceptions, the 68020 will run software written for the 68000. The advantage to using the 68020 over the 68000 is two-fold. First, the 68020 is a full 32-bit processor—it fetches, manipulates, and stores data in 32-bit chunks as opposed to the 16-bit chunks the 68000 stores and fetches. Also, the 68020 typically runs at a much higher clock speed than the 68000. In the case of the Hurricane Board, the 68020 runs at over 14MHz—double the clock speed of the 68000. All else being equal—and it isn't—the 68020 should run a minimum of twice as fast as the 68000.

The 68881 is a cousin to the 68020. Its job is to perform mathematical calculations at blinding speeds. It is very good at this. Hundred-fold increases in mathematical computing power are not unusual when you use the 68881 instead of performing floating-point math functions in software alone. Up to now, a major stumbling block to the acceptance of the 68881 has been the fact that so little commercial software has been written to take advantage of the chip. With the advent of Workbench 1.3, which contains automatic support for the 68881, more programs—and consequently more users—will be able to take advantage of the power of the 68881.

Installation

The Hurricane board is a piggyback board. Rather than plugging into an expansion slot (or the CPU slot on the Amiga 2000), the Hurricane board plugs directly into the motherboard of your computer. More precisely, the Hurricane board plugs into the socket that normally contains your 68000 microprocessor. Installation consists of opening up your Amiga, removing the 68000, and plugging the Hurricane into the vacated 68000 slot. Taking an Amiga 1000 apart is not too bad as long as you remember where all the screws go.

The Hurricane is a tight fit in the A1000, so you have to be careful not to bend any of the long pins that plug the board into the 68000 socket. I installed the board into two different A1000s as well as into an A2000 using an adapter board. I had no problems with any of the machines once the board was installed, but all the pulling and plugging weakened one of the pins on the board. When I shipped the board to an associate to look at, the pin broke off in transit. The broken pin is not the result of poor design or workmanship; it is a reminder that you (and I) should take extreme care in handling electronic components.

Compatibility and Performance

Because Commodore has constantly stressed the importance of 68020 compatibility with software developers, I wasn't surprised to find that none of the major commercial software packages I ran on the Hurricane board failed to function properly. What was a bit surprising, and pleasantly so, was the fact that the Hurricane board worked properly with all my expansion hardware, including a C Ltd Hard Drive on my A1000 and a BridgeBoard and A2090 Hard Drive Controller on my A2000. As far as compatibility is concerned, moving from the 68000 to the Hurricane Board is a near-seamless transition.

Performance is another matter. As the 68020 on the Hurricane Board runs at double the clock speed of the 68000, you might expect to see at least double the performance in an Amiga with the Hurricane installed. Unfortunately, because of the architecture of the Amiga, this theoretical increase in performance doesn't pan out.

In its native configuration, the Amiga bus has a clock speed of 7.16MHz. This clock speed governs the 68000, the custom chips, and access to chip RAM and ROM. Although the Hurricane board uses a 14.3MHz 68020, this chip must throttle back to 7.16MHz whenever it accesses anything on the Amiga bus. Consequently, as most Amiga functions involve accessing the bus, the 68020 spends much of its time running at 7.16MHz. The result is that you won't see a great increase in performance with software running on the Hurricane board.

When I ran the Dhrystone benchmark program dryr (Dhrystones using register variables) from Fred Fish disk #1, I came up with a figure of 645 Dhrystones with the Hurricane installed. This represents a 36% increase over the 472 Dhrystones you get

from a standard Amiga. When I tested the Hurricane board with software that supports the 68020/68881 combination, I got a more pleasant surprise. A rendering with Sculpt 3D that took 999 seconds with a standard Amiga (and 256 seconds with a CSA 68020 Board), was completed in 158.5 seconds on the Hurricane Board.

As you can see, the Hurricane Board provides a modest performance boost to any software your run. It comes into its own, however, when you run software that can take advantage of the on-board 68881. Math-intensive applications written for the 68881 will see performance increases of an order of magnitude over similar applications running on a native Amiga. Although Sculpt-Animate 3D and Turbo Silver are the only packages that, as of this writing, use the power of the 68881, I expect many more programs will do so in the near future. The Hurricane Board is ideal for heavy-duty graphics and number crunching; its usefulness will grow exponentially as the use of the 1.3 IEEE libraries becomes more widespread.

As this review was going to press, Finally Technologies forwarded a prototype 32-bit memory board for evaluation. This board connects to the Hurricane board and provides native 32-bit memory for use by the 68020. When accessing this memory, the 68020 can run at full speed. With 32-bit memory, I got an all-time high of 1215 Dhrystones. Sculpt 3D rendering time decreased to 106.5 seconds. As you can see, 32-bit memory really makes the Hurricane sing.

Conclusion

Currently, the Hurricane Board is the best way to increase the performance of your Amiga. Although it works best when you use software that supports the 68881, it does increase the performance of your Amiga in general. With 32-bit memory, the performance increase is substantial. The Hurricane Board is excellent for graphics and video applications. For general-purpose applications, however, the promise of the Hurricane Board lies in the future, with the acceptance and widespread use the the IEEE libraries in commercial programs. □

—Bob Ryan

existing RAM and ROM on the Amiga use a 16-bit data path, these chips are limited to the narrower path when they read instructions from normal Amiga memory, or when they execute ROM Kernel routines. The high-speed processors must also pause periodically when communicating with the slower Amiga memory. One way of counteracting these effects is to connect the replacement processor to its own supply of 32-bit memory. This allows it to load programs into the faster memory, and reduces the number of times that processor must access the slower Amiga memory when executing a program. Both Finally Technologies and CSA offer 32-bit memory boards.

With the addition of a Memory Management Unit (MMU), a coprocessor can transfer the Amiga ROM Kernel routines into 32-bit memory, and thus speed up all operations that use the operating system. (An MMU is a chip that protects memory from being overwritten and remaps memory locations. Both functions are used in moving the ROM Kernel routines to 32-bit memory. After the routines are copied into 32-bit RAM, the MMU protects the memory from being overwritten and reassigns the addresses for the routines to the 32-bit RAM. A MMU is standard on Commodore's A2620 board and is available as an option on the other two 68020 boards.)

The kind of speed advantage that accelerators provide, therefore, depends on whether or not they are equipped with 32-bit memory and an MMU. A plain 68020 board may not run programs significantly faster than the normal 68000 processor, because it must access the slower bus so often. With 32-bit memory, programs will generally run two to four times faster. Yet, without an MMU, even this speedup may not be very noticeable. A microprocessor often spends most of its time waiting for input from the user, and a 68020 chip really doesn't "wait" any faster than a 68000. Also, much of a program's time is spent calling ROM Kernel routines, which means slowing down to Amiga memory speeds. Therefore, using an MMU to transfer ROM routines to 32-bit memory should result in noticeable speedups in such routine operations as window redraws.

Perhaps even more important than the processor-speed increases that accelerator cards offer is the way in which they enable the integration of floating-point math coprocessor chips (such as those provided by CSA, Finally Technologies, and Commodore) into the system. Both the 68000 and 68020 can perform only basic math functions, while most floating-point math is done by software. A 68881 math coprocessor performs floating-point math in hardware—at speeds far faster than software. You could connect a 68881 math coprocessor to a 68000 system by interfacing it as a peripheral device (see MicroBotics) and achieve up to 10 to 20 times faster math calculations than software-based floating-point operations. When interfaced to a 68020 processor, however, a 68881 will do such calculations at speeds from 50 to 100 times faster. (CSA tells us that, in addition to the 68881 math coprocessor it has been marketing, it is now offering a 68882, which should produce even faster calculation speeds.)

The problem with using a math coprocessor is that in order to take advantage of it, software must either be written specifically for the 68881, or must be written using the Amiga IEEE math libraries. Because the use of 68881 chips is still so rare, very few programs take them into consideration. Compilers such as the AC Fortran and Manx C make special provisions for generating 68881 code—meaning that for custom scientific applications, an Amiga can run faster than a VAX 11/780. Although very few commercially available applications programs take ad- ►

vantage of the 68881, this may change as the use of accelerator cards and math coprocessors becomes more widespread and prices continue to fall. One particularly well known example of such a popular commercial software package making use of 68881 technology is a special version of Byte by Byte's Sculpt-Animate 3D that can generate ray-traced drawings up to 20 times faster when used with a 68020-68881 accelerator. A similar type of package, Prism's Turbo Silver, also shows dramatic increases in speed when used with a 68881.

THE POWER PLAYERS

[*Note: See the Product Information box for further information about products described below.*] Hardware accelerator boards for the Amiga are currently available from CSA and Finally Technologies. CSA offers a 14MHz 68020 board with a 68881 math coprocessor, along with two versions of 32-bit memory cards. One type of memory card uses up to 2MB of static RAM chips, which are much faster than dynamic RAMs, but much more expensive as well. The other type of memory card uses the slower dynamic RAMs, but allows you to add up to 32MB of 32-bit memory. CSA also offers a piggyback 68030 board (running at 16 MHz with a 68882 coprocessor) that offers processing that is up to four times faster than the 68020.

The Hurricane board from Finally Technologies offers a 14MHz 68020, a 16MHz 68881, and up to 4MB of 32-bit dynamic RAM. Finally also offers a 68030 upgrade that will boost your existing 68020 Hurricane board.

It is also possible to obtain 68881 math coprocessors separately. MicroBotics offers a multifunction module for its StarBoard memory card that can add a 68881 to any Amiga. Progressive Peripherals & Software is also planning to offer memory products that will incorporate the 68881, using the same

Amigas in the Laboratory

COMMODORE MAY HAVE a tough time selling the Amiga in certain markets, particularly the business community, where its name is too closely tied to the home computer market. One market that doesn't have to be sold on the benefits of the Amiga, however, is the technical market. Reseach labs, universities, video production houses, even employees of other computer manufacturers are not put off by Commodore's past; they recognize an elegant, sophisticated system when they see one.

Consequently, the Amiga is being used in ways that would shock anyone who looks upon it is a home computer. From the banks of the Charles to the shores of the Pacific, the Amiga is satisfying the needs of technical users across the country.

• At Ohio State University, Professor Charles Csuri of the Advanced Computing Center for the Arts and Design is integrating the Amiga into the apE (Animation Production Environment) project. apE is both a set of tools and a development environment that allow researchers, students, and others to visualize the results of experiments and simulations. Currently, apE is being developed on a Cray supercomputer. One of the goals of the project, however, is to make the power of the system available to students at all levels. With its low cost and high performance, the Amiga is an obvious choice as a low-end apE workstation. Using Amiga products such as Animate 3D, the apE project hopes to make the concept of scientific visualization available to students of all ages.

• The University of North Dakota's Center for Aerospace Sciences has been studying the physics of clouds since 1980. One part of the study is the Aircraft Icing Research Program, designed to determine those cloud structures more likely to produce icing on aircraft. The goal of the program is to be able to predict and avoid icing situations. The Center uses an Amiga mounted in a Citation jet as a front-end to a powerful minicomputer. The Amiga acts as an intelligent display station for the minicomputer. The information it displays directs the pilot into different parts of a cloud, where critical data is gathered. Without the Amiga's real-time display, flying into the correct spot in a cloud would be a hit-or-miss operation.

• At the University of Lowell (MA), Rich Miner of the Center for Productivity Enhancement directs a team of engineers and students that is looking to create a standard, device-independent image-processing system. Called the Image Kernal System (IKS), this system lets researchers run the same image-processing programs on different hardware systems. To demonstrate the system, the Center has produced an expansion board for the Amiga 2000 that implements IKS. Future work at the center includes work on pattern- and edge-detection and the development of high-resolution graphics hardware for the Amiga. (For more information on the latter item, see the main article under the section "High-Resolution Displays.")

• At Palomar Observatory, Fred Harris of Cal Tech uses the Amiga to calibrate the Charged-Coupled Device cameras that have replaced photographic plates as the mainstay astronomical-recording media. The Amiga is also used as a front-end data system for observation and analysis at Palomar. In the future, the tracking system for the giant 5-meter Hale Telescope may be controlled by an Amiga. (For more information, see "Searching the Heavens," p. 71, in the November '87 issue of *AmigaWorld*.)

• At the UCLA School of Medicine, Dr. Ron Harper uses the Amiga to combine information from different imaging technologies to obtain a comprehensive view of the human brain. (See "Surgery . . . 68000-Style," p. 57, in the January '88 issue of *AmigaWorld*, for more information.) Also at UCLA, Professor John Hodgson uses the Amiga to research how the body moves.

These institutions and others, such as NASA and Sandia Labs, have discovered the power and versatility of the Amiga. As more people discover the price/performance advantage of the Amiga, you can expect to see it on many more scientific workbenches. □

—Bob Ryan

Enter the Integrators

ONE PROBLEM FACING the Amiga in the workstation market is the fact that every installation must come up with its own hardware and software configuration. Faced with continuously "reinventing the wheel," many customers opt for more mature systems. Such a situation is ripe for companies willing to do the system configuration.

Tucked away in a basement office in Ludlow, Massachusetts, is a small company with big plans. Amicore International is a start-up operation that hopes to capitalize on the power of the Amiga 2000 to revolutionize the workstation market.

The goal of Amicore is to develop a "hypermedia" workstation using the Amiga as the foundation. By combining graphics, audio, video, and other media as only the Amiga can, Amicore hopes to be able to produce a product that appeals to scientists and videographers alike, and anyone in between.

Amicore consists of four principals with varying backgrounds. President Andy Petrie is an inventor with a long history in high-tech companies, Rudi Vogel comes from a marketing background with DEC, Don Petrie is a graphics designer, and Mike Perrella is the video expert. They hope to provide the know-how needed to catapult the Amiga into the high-end workstation market.

Amicore is starting small. To make ends meet, it produces adapter cables that let you run Amiga 1000 peripherals, such as Digi-View and FutureSound, on the Amiga 500 and 2000. By November, the principals expect to offer their first workstation system, consisting of an Amiga 2000, advanced graphics hardware (that they plan to license), and commercial and custom software. Amicore wants to hear from other Amiga developers interested in the hypermedia concept. The address is Amicore International, 451 Center St., Ludlow, MA 01056.

To further develop the hypermedia workstation, Amicore is building a digital media lab. The lab will be a proving ground for the hypermedia concept. In addition to selling bundled turnkey systems, Amicore expects to sell entire hypermedia installations, and to provide training and service.

Does Amicore have a chance? Based upon the growing realization of the Amiga's capabilities in the video and scientific markets, the future looks good. Its success will depend upon how well it integrates technologies and products from different sources. □

—Bob Ryan

scheme as Microbotics to interface the chip. Official support for the 68881 interfaced as a peripheral device will be included in Workbench 1.3, which should spur software manufacturers to add math chip support to more of their software.

A number of other accelerators are currently in the works. MicroBotics is working on a full line of accelerators for A500 and A2000 computers. Commodore has already announced its own A2620 accelerator card for the A2000 in Europe, containing a 68020, a 68881 math coprocessor, a 68851 MMU, and two or four megabytes of 32-bit RAM. Whether the A2620 will be available in the US is subject to speculation, as Commodore is sensitive about treading on the toes of the growing number of third-party accelerator manufacturers already in the American market.

High-Resolution Displays

The second characteristic of workstations is a very high-resolution display screen. The Amiga's 640 × 400 16-color display capability isn't bad for starters, particularly as its ability to use the overscan area of the screen can push this resolution to over 700 × 440. In order to get 400 lines of resolution on a 200-line monitor, however, the Amiga must use an interlaced display. This type of display makes the Amiga a good choice for video work, where interlacing is standard, but the "flicker" it causes makes the computer's high-resolution mode very difficult to work with for more standard computer applications.

MicroWay offers a de-interlacing board called the flickerFixer, which retails for $595 and fits into the video slot of the Amiga 2000. Because the A500 and A1000 both lack this video slot, they cannot take advantage of the MicroWay card. flickerFixer provides a steady, non-interlaced 400-line output that can be displayed on a multi-scanning monitor, such as the NEC MultiSync. Although the combination of display card and monitor is fairly expensive by Amiga standards, the business or professional user may find it to be well worth the cost. Using flickerFixer with the A2000 is something of a revelation. It makes programs such as Professional Page and X-CAD look much more like worthy competitors to similar programs on IBM and Macintosh systems. It even makes the Workbench look more professional. flickerFixer should enhance almost any kind of professional application, except those using video software, which requires an interlaced output. In general, high-resolution animated displays will always appear a little jerky, because flickerFixer combines the interlaced fields. (For a more complete evaluation of flickerFixer, see p. 64 in this month's Review section.)

Commodore has announced that it too is working on several display enhancements, including an enhanced chip set. Consisting of upgraded Agnus, Denise, and Gary chips, the set will output a non-interlaced 400-line display to dual-scanning or multi-scanning monitors. The new chips will not be available until the release of Workbench 1.4 and probably will not work on the Amiga 1000. They will, however, be a cheaper alternative to the flickerFixer, although it is doubtful they can provide all of its functionality. ►

Because it would be difficult to increase the existing display bandwidth, the 400-line non-interlaced displays will have only half as many color bit planes as the 200-line displays. This means a maximum of four colors in 640 × 400 mode, with the same sort of performance penalities for memory operations in chip RAM that you currently get with 16-color hi-resolution displays. Still, a true 640 × 400 color display gets us a lot closer to workstation range.

Commodore is also working on a new high-resolution gray-scale monitor, the A2024, which should sell for under $1000. It will work with all Amiga models because it uses the standard Amiga video port. The A2024 can be used to de-interlace the normal Amiga display, providing a 640 × 400 display with up to eight gray levels, and it will also support an extended display of up to 1008 × 800 pixels at two or four gray levels. Normally, the largest display segment that the Amiga hardware can output at one time is 640 × 400 pixels, two color planes deep (four colors). Therefore, a combination of hardware and software trickery is required to create the extended display. The software creates a bitmap made up of from four to six normal-sized displays. It then sends this display out a piece at time to the monitor, which stores each piece in RAM until it can assemble the entire picture. As a result, the screen is only redrawn 10 or 15 times a second, instead of the normal 60 times.

This characteristic will make it difficult to do smooth animation on the A2024, but it will not impair its usefulness as a display for desktop publishing or CAD programs. Because the screen memory used for the extended display is organized as one large Amiga bitmap, all graphics and text operations are carried out using the normal Amiga operating system routines. Programs that can adapt to a larger-than-normal size Workbench screen will run on the extended A2024 screen without any changes. Other programs will need only minor modifications to take advantage of the big screen.

"Viewing" the Future

Such enhancements take the current Amiga display hardware about as far as it can go. In order to get closer to the kinds of screen resolutions typical of workstation computers, entirely new display hardware is needed. A group at the Center for Productivity Enhancement at the University of Lowell in Massachusetts has built a prototype of a graphics card for the Amiga 2000 that can display 1024 × 800 pixels, using 10 color bit planes. This means that 1024 colors (out of a palette of 16.7 million) can be displayed on screen at once. The board uses a Texas Instruments TMS 34010 display chip clocked at 50MHz, and includes 512K of dynamic RAM for on-board programs and 1.25 megabytes of video RAM. The display chip contains its own on-board blitter. Although the group is undecided about manufacturing the board commercially, it points out that similar cards in the IBM PC market cost about $2500. (For more information about the Lowell group, see the accompanying sidebar "Amigas in the Laboratory.")

While the Lowell card provides the type of high-resolution color display typical of workstations, the question of how to get software to use that display remains up in the air. The Lowell group plans to provide a graphics library that could be called directly from software, and it is working on display programs to allow several IFF files to be shown on the display at the same time. It also would like to implement an X-Windows driver, so that an Amiga with this enhanced display could be used as a high-resolution graphics terminal for X-servers. The most desirable way to integrate this high-resolution display, however, would be to develop Intuition support for it. Existing Amiga software could then take advantage of it without substantial modifications. To develop such support would require a complete rewrite of the current Amiga ROM Kernel graphics library, which is linked inextricably to the current Amiga display hardware and blitter. As formidable as such an undertaking may seem, it is absolutely necessary if display resolutions on the Amiga are to catch up with the current state of the art.

Networking

The final requirement for workstations is the ability to connect with mainframe computers and other workstations over a network. In a group development situation, it is vital that all members of the group have access to a collection of shared files. Networking also makes it possible to use the Amiga as a graphics display engine for data generated by a number-crunching mainframe computer.

The only full-featured network system for the Amiga is the Internet package from Ameristar. At $899, it includes an Ethernet controller board and a number of programs for communicating over the network. The most powerful software it provides is an implementation of the Network File System (NFS) widely used on Unix systems in universities, research labs, and large corporations. Using NFS, the Amiga can transparently access files stored on a Sun or VAX system. For example, what the VAX system sees as the user/amiga directory, the Amiga may see as DH0:. Other programs allow the Amiga to run as a terminal on the network, and to execute programs on a host computer. There is also software for retrieving files from non-Unix systems.

Ameristar representatives say that the company sells about one-half of its controllers to universities, who want to use the Amiga to add graphics output to mainframe applications, and another half to corporations, who want to use Amigas largely as inexpensive terminals on existing Ethernet systems. Ameristar plans to add support for networked windowing systems, such as X-Windows and Sun Microsystems' NEWS. Support for such systems would make it possible to run mainframe programs using a windowing graphics interface on the Amiga, and X-Win- ►

Product Information

Networks

Internet
Ameristar Technologies
47 Whittier Ave.
Medford, NY 11763
516/698-0834
$899

SCSI Controller and SCSI-Net Software
C Ltd
723 East Skinner
Witchita, KS 67211
316/267-3807
$249 for A500, $299 for A1000, $199 for A2000

Hi-Res Displays

flickerFixer
Microway
PO Box 79
Kingston, MA 02364
617/746-7341
$595
Multi-sync monitor required.

Accelerators and Coprocessors

Hurricane Board
Finally Technologies
25 Van Ness, Suite 550
San Francisco, CA 94102
415/564-5903
$995 for A1000, $1095 for A2000, 20MHz and 25MHz versions available for additional $100 and $250, respectively

32-bit Memory Board
Finally Technologies
$595 unpopulated, up to 4MB (16MB by 1989) possible, call for chip prices

68030 Upgrade
Finally Technologies
$345 for interface card, $695 for 030 chip to plug in Hurricane
Hurricane Board required.

Starboard2
MicroBotics Inc.
811 Alpha Dr., Suite 335
Richardson, TX 75081
214/437-5330
prices range from $495 unpopulated to $1119 2MB

Multifunction Module
MicroBotics Inc.
$99.95 for board, $380 for 68881 chip
Starboard2 required.

EXP-8000
Progressive Peripherals & Software
464 Kalamath St.
Denver, CO 80204
303/825-4144
up to 8MB of RAM, 68881 coprocessor of up to 20MHz, price to be announced approximately August '88.

68020 CPU Board (CPU-992M)
Computer System Associates (CSA)
7564 Trade St.
San Diego, CA 92121
619/566-3911
$995

68881 Coprocessor
CSA
$295

68882 Coprocessor
CSA
$695 for 16 MHz, $995 for 25 MHz

32-bit Static RAM
CSA
$595 unpopulated, $695 for 512K with Kickstart in ROM, $1495 for 1MB, $2995 for 2MB

32-bit Dynamic RAM
CSA
$695 unpopulated, $695 for each additional megabyte

68030 Board (16MHz with 68882)
CSA
$2580

Piggyback
CSA
$895

CAD and Circuit Simulation Software

Aegis Draw
Aegis Draw Plus
Aegis Development Corp.
2115 Pico Blvd.
Santa Monica, CA 90405
213/392-9972
800/345-9871
$125
$259.95
512K required.

Digital Building System
MicroMaster Software
1289 Broadhead Rd.
Monaca, PA 15061
412/775-3000
$299
512K required.

Dynamic CAD 2.3
MicroIllusions
17408 Chatsworth St.
Granada Hills, CA 91344
818/360-3715
800/522-2041
$499.95
512K required.

IntroCAD
Progressive Peripherals
464 Kalamath St.
Denver, CO 80204
303/825-4144
$79.95
512K required.

LogicWorks
Capilano Computer Systems
1168 Hamilton St., Suite 501
Vancouver, BC
Canada V6B 2S2
604/669-6343
$299.95
512K required.

PCLO
PCLO Plus
SoftCircuits Inc.
701 NW 13th St., Suite C4
Boca Raton, FL 33432
305/368-7024
$199.95
$499.95
512K required.
One megabyte required.

PRO-BOARD
Prolific Inc.
1808 W. Southgate Ave.
Fullerton, CA 92633
714/447-8792
$475
One megabyte required.

PRO-NET
Prolific Inc.
(see address above)
$475
One megabyte required.

Scheme
SoftCircuits Inc.
(see address above)
$199.95
One megabyte required.

UltraCAD
Progressive Peripherals
(see address above)
To be announced.
One megabyte required.

X-CAD
Taurus-Impex
distributed by Haitex Resources
208 Carrollton Park, Suite 1207
Carrollton, TX 75006
214/241-8030
$599.95
Two megabytes required.

dows, which would further enhance the machine's capabilities as a graphics terminal. Ameristar also hopes to introduce a lower cost Ethernet network card for the Amiga 500.

The only other network currently offered on the Amiga is a low-cost point-to-point system based on the C Ltd SCSI controller. The controller, which ranges in cost from $299 for the 1000 version to $199 for the 2000 version, is normally used to interface SCSI hard drives. Using the SCSI-Net software the company packages with the controller, however, it is possible for several Amigas to share a single hard drive over the SCSI bus, at SCSI speeds. While this setup is useful in certain situations, it is subject to a number of limitations. There is a 30-foot maximum on cable lengths between machines, and only eight devices can be connected to the bus at any one time. There are also no provisions for file-locking, a feature that prevents one user from overwriting changes made to a file by another user. The company plans to remedy these deficiencies in the next version (3.0)—due out shortly after the official release of the 1.3 version of the Amiga operating system—by adding file-locking, by implementing noding (which will allow the interconnection of up to 255 buses), and by adding other enhancements that should make SCSI-Net a much more LAN-like system.

Although not yet available, some other networking systems are rumored to be in the works. Commodore is reported to be interested in developing a TOPS network system for the Amiga, which would enable communication with Sun, Macintosh, and DEC computers. The plan calls for a system based on low-cost hardware similar to that of the Macintosh AppleTalk network. As of yet, however, no definite plans for such a system have been announced.

Even without the additions described in each of the three sections above, the Amiga stacks up pretty well as a personal workstation. The availability of third-party network systems, display enhancements, and accelerator boards do, of course, make the machine very attractive to the scientific, educational, and technical communities. This does not mean, however, that Commodore can simply let the third-party developers blaze the workstation trail all alone. Workstations are growing ever more sophisticated and less expensive. Commodore must act quickly to prepare the Amiga for the higher-resolution displays, 32-bit buses, and built-in networking capabilities that are increasingly becoming standard features on personal computers. ■

Sheldon Leemon is the author of Inside Amiga Graphics *and other books, and he is a frequent contributor to* AmigaWorld *and other computer publications. Write to him c/o* AmigaWorld, *80 Elm St., Peterborough, NH 03458.*



Aztec C's NEW Source Debugger Takes The Work Out Of Debugging!

Stop entering print statements and re-compiling over and over. Stop spending your time looking at assembly language and hex dumps. Stop agonizing over features you need but can't find . . . Start using Aztec C's NEW Source Debugger (SDB). It has all the features you expect and more!

SDB FEATURES

- Multiple task debugging
- Debug your code at the Source Level
- Set Breakpoints and Single Step by Source Line
- Access all Global and Local Variables by Name
- Evaluate and Print the Value of Any C Expression
- Displays all Structure Element Names and Values
- Assembly Language Debugger for intermixed routines
- Debug drivers
- User Control of Color-background and text
- Separate Color Windows for Source, Data and Commands
- Supports 1.2 and 1.3 Amiga resident libraries
- Supports 68010, 68020 and 68881 processors
- Re-usable command macros and procedures enables you to customize the debugging environment

And with Aztec C you get optimized C, support for scatter loaded and segmented programs, support for all floating point formats, and the clean, fast and compact code you need.

SDB Special through August 31, 1988

30 Day Satisfaction Guaranteed

Source Debugger (Reg $125.)	**ONLY $ 75.**
Aztec C68k/Am-p Professional System	**ONLY $199.**
Aztec C68k/Am-d Developer System	**ONLY $299.**
Library Source	**ONLY $300.**
Developer System with Source Debugger and Library Source (Reg $724)	**ONLY $474.**

COD, VISA, MC, Wire (domestic & intl.) & terms

Take Advantage of the Introductory Special / Call Today

1-800-221-0440 (outside NJ)

201/542-2121 (NJ and Outside U.S.)

Telex: 4995812MANX
Fax: 201/542-8386

Circle 31 on Reader Service card.

Aztec by MANX

1 Industrial Way, Eatontown, New Jersey 07724



The AmigaDOS Workout Disk

Through a strict regimen to slim down and strengthen up, ARP will have your CLI commands benchpressing more directories and running more files than their overweight AmigaDOS counterparts thought possible.

By W. Jeffrey Blume

UNDER THE SUPERVISION of their ARP (AmigaDOS Replacement Project) trainers, the CLI commands are trimming down and toning up. Originally programmed on a diet of the cumbersome BCPL language (Basic Combined Programming Language, a predecessor of C), the AmigaDOS commands are slow and large with limited power. ARP, a joint programming effort led by Charlie Heath of Microsmiths, is whipping the BCPL flab into 68000 assembly-language muscle. The ARP programs, and arp.library that they depend on, will replace the existing C directory commands. Completely backward compatible with AmigaDOS commands, the ARP commands offer you many new features, including greater wildcard capabilities, more on-line help, resident commands, environment variables, resource tracking, and low-memory management. Needing an average of one-half the calories of the current AmigaDOS commands, the ARP replacement programs melt away approximately 35K from your Workbench disk, while supplying more power, speed, and accessibility.

Load, Set, Run

The most apparent ARP improvements are the new commands that have no BCPL equivalents—ARUN, LOADLIB, and SET. Two other commands are new to users of AmigaDOS 1.2, but familiar to 1.3 owners—ARP's ASK and RESIDENT. When included in script files, ASK lets you query the user about performing specific tasks. RESIDENT lets you make commands resident in memory, allowing much faster execution than even RAM-disk-based commands.

ARUN combines the capabilities of RUN with those of Heath's public-domain program, RUNBACK. As with AmigaDOS' RUN, ARUN will execute a program in the background and return CLI control to you. ARUN's additional arguments let you set the stack for the program and its task priority. With many programs, you can even close the CLI while the background program is still running, which frees about 20K of memory. One minor drawback is that you must use escape characters to pass strings through ARUN. The * is ARP's default escape character; if you prefer to use a different character, the new SET command lets you reassign the default.

LOADLIB will load any disk-based library. If your boot disk is too full to include all the libraries you need, you could load them into the system with LOADLIB. With SET you can assign values to environment variables, which let you configure different aspects of the Amiga's system environment. Similar to the SET provided with Manx Aztec C, ARP SET is com- ►

ILLUSTRATED BY JOSÉ CRUZ

patible with programs compiled by Manx that read enviroment variables.

ARP currently supports several environment variables—copyflags, dateformat, and listarchive. Through SET and the copyflags variable you can instruct the COPY command to reproduce certain characteristics of the original file when it creates the new file. You can duplicate the filenote and the original date, as well as the Read, Write, Execute, Delete, and Archive flags. If you would rather avoid the SET command, you can instruct COPY to duplicate the file characteristics by supplying the FLAGS keyword and its options in the COPY command line. Either method is an improvment over the BCPL COPY, which cannot duplicate filenotes and stamps the current system date on the new file.

Comparison of ARP and AmigaDOS Commands

Command	ARP Bytes	DOS-1.3 Bytes	Added Features of ARP
ADDBUFFERS	504	876	Accepts up to 4 drive/buffer pairs
ARUN	1176	NCS	Combines RUN and RUNBACK (pd); Stack can be set with STACK keyword; NOIO switch allows closing of CLI while background program is still active
ASK	556	648	Queries before executing batch file routine
ASSIGN	968	2960	Accepts multiple assignment pairs; – option to remove with multiple assignments
AVAIL	NCS	1772	NCS
BINDDRIVERS	NCS	2920	NCS
BREAK	452	956	BC
CD	664	1756	Accepts wildcards; ROOT keyword assigns to drive rather than disk; can report in CLI prompt (see ARP PROMPT)
CHANGETASKPRI	488	1076	Verifies priority value; keyword TASK can change priority of running tasks
COPY	2244	9296	FLAGS keyword or copyflags environment variable, filenotes, original datestamps, and protect bits may be copied; enhanced wildcards;* = console NOT supported
DATE	1120	4208	Leading zeros no longer required; can set and report time to the second; dateformat environment variable
DELETE	1060	5568	ASK switch with enhanced wildcards; no longer limited to 10 filename arguments
DIR	2120	8500	OPT options, F (Files only), H (Highlight directories), S (File sizes); explicit keywords for all options, ALL, DIRECT, FILES, HILITE, INTERACT, SIZE
DISKCHANGE	400	680	BC
DISKDOCTOR	NCS	6672	NCS
ECHO	260	564	No longer requires strings to be quoted
ED	NCS	19564	NCS
EDIT	NCS	18164	NCS
ELSE	540	860	BC
ENDCLI	NCS	692	NCS
ENDIF	40	40	BC
ENDSKIP	NCS	40	NCS
EXECUTE	NCS	4532	NCS
FAILAT	388	1028	BC
FAULT	NCS	2688	(See ARP WHY command)
FF	NCS	3200	NCS
FILENOTE	356	690	(See ARP COPY [FLAGS] option)
GETENV	NCS	916	NCS
IF	824	1600	BC
INFO	992	2068	Reports formatted capacity
INSTALL	800	2416	Writes a consistent set of data to the boot block, improves detection of a boot block virus
JOIN	580	1056	Accepts and sorts wildcard filenames before joining; no longer limited to 15 files
LAB	40	40	BC
LIST	2076	9696	SORT option; supports environment variables: dateformat and listarchive; the latter lists the status of a file's archive bit

The dateformat variable specifies the format of input and output for commands such as DATE, LIST, and SETDATE. The default format is day-month-year, but with SET and dateformat you can select one of four arrangements.

You use the listarchive variable to instruct the LIST command to display the status of a file's archive flag, in addition to the RWED flags. An A displayed with the flags indicates the file has been archived by a backup utility.

ASTERISKS WILD

Unlike AmigaDOS' awkward and inconsistent wildcard usage, ARP commands support the * wildcard character similiar to that on MS-DOS. Nearly every command that you would expect to accept wildcard ►

Command	ARP Bytes	DOS-1.3 Bytes	Added Features of ARP
LOADLIB	496	NCS	Explicitly loads a disk-based library
LOADWB	NCS	2644	NCS
LOCK	NCS	2068	NCS
MAKEDIR	416	768	Create multiple and nested directories
MOUNT	2204	5432	Mounts multiple devices; STARTPROC option loads driver or handler immediately
NEWCLI	NCS	2784	NCS
NEWSHELL	NCS	2732	NCS
PATH	736	2136	Supports wildcards; no longer limited to 10 directory arguments
PROMPT	484	584	New %P option will dynamically display current directory in the prompt
PROTECT	572	1396	Supports wildcards
QUIT	424	1036	BC
RELABEL	476	828	BC
REMRAD	NCS	304	NCS
RENAME	984	632	Accepts wildcards, permitting movement of multiple files with one command
RESIDENT	1036	2620	Makes commands RAM resident
RUN	NCS	2716	(See ARP ARUN)
SEARCH	1100	6332	Supports wildcards
SET	572	NCS	Sets the values of environment variables and the system escape character; compatible with Manx SET
SETALERT	NCS	3312	NCS
SETCLOCK	NCS	4556	NCS
SETDATE	884	2632	Accepts wildcards
SETENV	NCS	836	(See ARP SET command)
SKIP	664	1108	New ? option queries user for the label to skip to
SORT	872	1868	Will not crash if file is too large to sort; CASE switch for case sensitive sorts
STACK	384	872	BC
STATUS	704	1752	BC
TYPE	1196	2284	Supports wildcards; multiple filenames; can join wildcarded files into destination file; files typed to PRT: will be labeled by filename and separated by form-feeds; by leaving out input arguments, console output can be redirected to a file or device
VERSION	312	2424	Reports arp.library version, as well as Kickstart and Workbench versions
WAIT	664	1372	BC
WHICH	NCS	1872	NCS
WHY	1376	576	Combines WHY with FAULT; if supplied a fault number for an argument, it will print the corresponding error message
XICON	NCS	3156	NCS

NCS = Not Currently Supported (as of AmigaDOS v1.3 and ARP v1.1)

BC = simple backward compatibility with AmigaDOS

arguments now does, increasing the CLI's power enormously. For example, with the new RENAME command you can type:

RENAME ARP_c/* to c

to move all the commands from a directory named ARP_c to the logical device c:. With the BCPL RENAME command you could rename only one file or directory at a time.

In addition to accepting the wildcard, several ARP commands can handle multiple sets of arguments. In a single ARP ASSIGN statement, for example, you can transfer all of the system logical devices to a hard drive. With AmigaDOS, you would have to call ASSIGN for each individual device—a minimum of seven separate calls. The new ADDBUFFERS lets you assign buffers to four different drives in one statement, while MAKEDIR, RESIDENT, and TYPE also accept multiple arguments.

For help remembering all the new ARP commands and options, type a command followed by a question mark. As with the original commands, the system will respond with the command template. Typing a question mark after the template will give you a second line of clarification.

No More Crutch Conventions

Not as obvious to users, the current operating system presents handicapped power to developers. Constrained by its DOS library and arcane BCPL language conventions (see the sidebar "Programming With a Forked Tongue"), programmers are forced to maintain two sets of conventions, one that BCPL understands and one for the rest of the system. With the consistent arp.library, programmers can organize their code, creating more efficient programs. Several of the library's routines help developers speed up and streamline the dialog between their programs and the users. Programmers can create and include environment variables in their commercial software for setting mulitple defaults. The arp.library's FileRequest( ) function is a greatly enhanced version of the Heath file requester, reputed to be one of the fastest on the Amiga. Most requesters read and display an entire directory before letting you take any action. The Heath requester (used by many Aegis programs, Photon Paint from MicroIllusions, and City Desk from MicroSearch) allows you to click on a file or directory as soon as it is displayed. The requester immediately interrupts its current directory read, and either loads the file or displays the new directory list you specified. You will especially appreciate this shortcut when you access deeply nested directories. The ARP requester improves further on its predecessor by adding a parent gadget, which will send you back one level in the directory hierarchy, and also by allowing programmers to easily append multiple gadgets, such as DF0:, DH0:, and DH1:. Developers can also add string gadgets to supply filters for selectively displaying files. For instance, you could include a filter so that a paint program's requester would display only files with the suffix .pic. When the user asks for a DIR listing, the requester will not clutter the lising window with extraneous files. To accelerate directory accesses even more, click in the listing window with the right mouse button. The requester will display a listing of all available physical and logical devices, allowing you immediate access to files without having to wade through the intervening levels of the directory tree.

While the developers were tinkering they added numerous other useful functions. The GADS( ) argument parser helps provide a consistent format for CLI commands. Assign( ) and ASyncRun( ) allow programs to make logical device assignments and run external programs, without having to access the disk-based ASSIGN and RUN commands.

One function needed by any multitasking operating system, but not supplied with AmigaDOS, is resource tracking. In a multitasking system, several programs must be able to share the same resources, such as memory, files, logical devices, and so on, freeing up those resources when they are finished, rather than doing such nasty things as overwriting each others' data structures or exiting while leaving 200K of memory tied up.

Using functions supplied by the arp.library, you can track and free resources automatically when you close it. ARP's resource tracking also provides low-memory management, permitting memory reserved by a program to be released in a low-memory situation, if the program is not actually using the memory at that time.

Besides offering totally new commands, ARP adds extra capabilities to AmigaDOS staples. You can use CD and PROMPT together to display the current directory, the task number, and a text string in the CLI prompt. The new CHANGETASKPRI can change the priority of a task that is already running. DELETE now will accept an unlimited number of files as arguments, and it also has an interactive ASK keyword you can use with wildcard deletions. DIR offers options to display file size, to list files only, or to distinguish directories with inverse highlighting. ECHO no longer needs its string arguments to be enclosed in quotes. Through its new ability to accept multiple arguments, MAKEDIR can create a directory, then nest subsequent levels of directories within it, all with one invocation of the command. For a command by command list of ARP's improvements, see the accompanying chart, "Comparision of ARP and AmigaDOS Commands."

ARP Support

ARP's on-disk documentation is in two sections—UserDocs and ProDocs (for programmers)—and generally follows the conventions of *The AmigaDOS Manual* (published by Bantam Books). A few examples and descriptions, however, need to be clarified. The sample command for using ARUN with string arguments►



Retrieve more online for less with GEnie.™

"I've really tracked down superior selection and service with GEnie. I always knew GEnie was ahead of the pack with the Starship Amiga RoundTable™ Special Interest Group, featuring over 4000 software files, dynamic bulletin boards, lively discussions and "tips" from the experts. And now I can sink my teeth into valuable information services like American Airlines EAASY SABRE™ personal reservation system, discount shopping with Comp-u-store Online,® new and exciting multi-player games and access to Dow Jones News/Retrieval.® And those GEnie people are so dog-gone friendly!

You're barking up the wrong tree if you don't look to GEnie for value, service and selection for your Amiga. Only GEnie offers you so much online, for less."

B. A. Retriever

Services Available	Compare & Save	Pricing**			
		Registration Fee	Monthly Minimum	Non-prime Time Rates 300 baud	Non-prime Time Rates 1200 baud
Electronic Mail • CB • SIGs/User Groups • Travel • Shopping • Finance • Reference Professional • Leisure • Games • News	**GEnie†**	**$29.95**	**None**	**$5.00**	**$5.00**
	CompuServe	$39.95	None	$6.00	$12.50
	Other	$49.95	$10.00	$8.40	$10.80

**Get 2 Free Hours with Sign-Up.*

Still just $5 per hour. Get online today!

1. Have your major credit card or checking account number ready.
2. Set your modem for local echo (half duplex)—300 or 1200 baud.
3. Dial 1-800-638-8369. When connected, enter HHH
4. At the U#= prompt enter **XJM11771,GEnie** then RETURN.

Need help or more information? No modem yet? We can help. In U.S. or Canada call **1-800-638-9636** or write GEnie, 401 N. Washington Street, Rockville, MD 20850.

We bring good things to life.

**Basic rates and services in effect 1/88 apply in U.S. only. †Non-prime time rates apply Mon.-Fri. 6PM-8AM local time and all day Sat., Sun., and nat'l. holidays. Subject to service availability. Some services offered on GEnie may include additional charges. Dow Jones News Retrieval is a registered service mark of Dow Jones & Co., Inc.
*$10 credit applies. Offer good for 30 days from sign-up.

Circle 111 on Reader Service card.

Programming With a Forked Tongue

SINCE ITS INCEPTION, AmigaDOS has been speaking out of both sides of its mouth. The original Amiga programmers wrote most of the Amiga ROM Kernel (housing the intuition.library, dos.library, graphics.library, and so on, all managed by Exec) in efficient 68000 assembly language or C. Meanwhile in England, Metacomco was programming the DOS (Disk Operating System, which is only a part of the greater OS) in BCPL (Basic Combined Programming Language, a predecessor to C).

The clash comes because the BCPL conventions are much different (some are even exactly opposite) from analogous conventions in C and 68000 assembly language. Consequently, the DOS does not integrate well with the rest of the system. The specific problems lie in the way BCPL addresses memory (BPTRs), how it handles strings (BSTRs), and the stack.

BPTRs will allow only longword alignment. To insure that memory addresses are longword aligned, BPTRs divide the addresses by four, before acessing the dos.library. In C, the compiler handles address alignment; odd alignment cannot happen. According to Charlie Heath, one of the principals of the ARP project, the BPTR problem arose from the particular implementation of BCPL that Metacomco used, rather than from problems inherent in the language.

BSTRs are constructed quite differently than C strings. The first byte of a BSTR gives the length of the string, then the string itself follows with no terminating character. Because only one byte is used to define its length, a BSTR is limited to 255 characters. A C string can have an unlimited number of characters, marked at the end by a terminating character. Finally, a BCPL stack grows upward from its base in memory, exactly opposite to the way the 68000 processor manages the stack, moving downward from the base. The BCPL stack is decremental, while the 68000 stack is incremental.

The language problem requires programmers to maintain two different sets of conventions—one for addressing the dos.library and another for addressing the rest of the operating system—thus slowing development and increasing code overhead. This convoluted code was a significant motivation for the development of ARP. "The data interfaces are all different. . .that was half the problem, a nasty half," says Heath.

The other half of the problem, according to Heath, stems from the fact that the code in the dos.library and BCPL library is simply inefficient. The BCPL library was undocumented and could not be used by any programs but the BCPL commands. Programmers were forced into maintaining a parallel set of functions, thus duplicating their efforts.

One of the ARP programmers' primary goals was to remove any dependency on the BCPL library by replacing all the BCPL commands and supplying a library of functions that all programs could call. They succeeded in an eloquently compact fashion.

—WJB

uses a as an escape character. You can issue SET to assign as the escape character, but the default is an *. The COPY template in the manual erroneously designates FLAGS as a switch rather than a required keyword; the on-line template shows FLAGS/K. If you issue a COPY command with all but the flags argument correct, however, COPY displays its extended help message, rather than the template, while neglecting to mention the FLAGS keyword at all.

Integrating the commands into your system is quite easy. The distribution disk's execute file will install ARP automatically on your boot disk. If you are CLI inclined, you can issue the following commands:

```
copy ARPv1.1:libs/arp.library to libs:
copy ARPv1.1:c to c:
loadlib libs:arp.library
```

ARP is freely distributable with certain restrictions, and you can download it from most on-line services and bulletin boards that have Amiga special interest groups. If you prefer the old-fashioned postal service to telecommunications, mail $5 per copy of ARP to ARP Support, c/o Microsmiths Inc, PO Box 561, Cambridge, MA 02140.

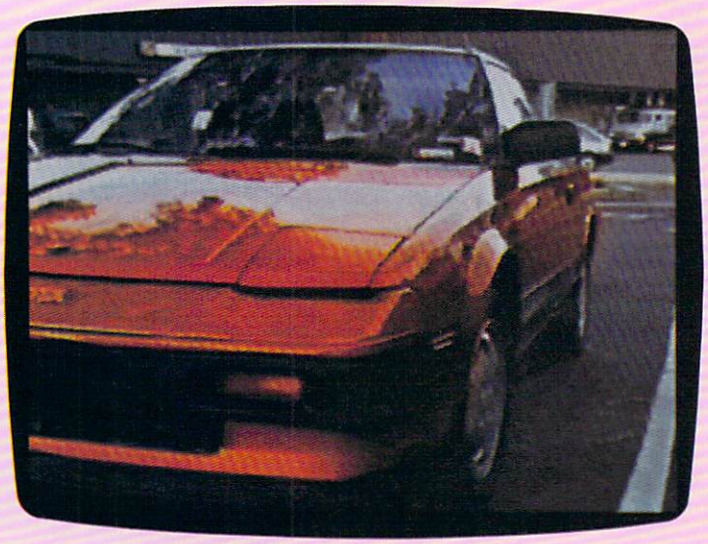
I found the ARP commands to be smaller, faster, and more powerful than their BCPL forerunners. Their compact size is especially helpful when you are running the commands out of a RAM disk. Be warned, however, that all benefits come at a price. ARP version 1.1 does not currently support BINDDRIVERS, DISKDOCTOR, ED, EDIT, ENDCLI, EXECUTE, FAULT (ARP's WHY does double duty for WHY and FAULT), LOADWB, NEWCLI, and RUN (see ARP's ARUN). Work is in progress, however, and the developers should soon release new additions to ARP's command set, including support of AmigaDOS 1.3's Fast File-System.

Commercial programs are beginning to support ARP. TxEd Plus from Microsmiths Inc. naturally supports the arp.library. Epyx's Sub Battle Simulator sports the ARP file requestor. Redact (a desktop-publishing program from Top Down Development) and WShell (a CLI enhancement program from William S. Hawes) are also joining the ARP parade. Even Commodore is taking notice. According to Heath, the ARP programmers offered the current version of ARP to Commodore free of charge, and would like to see it in ROM. Apparently Commodore is actively considering it, but because of negotiations, could not comment publicly.

In a market where the need for instant gratification pushes products out the door before they are ready, the careful planning and execution demonstrated by its developers make ARP a welcome exception. ■

W. Jeffery Blume is a freelance photographer, writer, graphic designer, and fire fighter. Write to him at PO Box 1671, Fort Collins, CO 80522.

New from SunRize Industries



Actual picture digitized with Perfect Vision and Color Splitter from a VCR.

PERFECT VISION

Capture pictures from a video camera or VCR. Display in color or store as IFF for use in compatible programs. Real time B&W images (1/60 second). Color images require a bit more time. Unit includes its own power supply and fine tuning adjustments for contrast and brightness. Compatible with model 500, 1000 and 2000 Amigas. **SUGGESTED RETAIL PRICE: $249.95**



STUDIO MAGIC

The ultimate music and sound workshop with 12 digital effects including echo, delay, flanges, etc. Input sounds from stereo, VCR or microphone (with Perfect Sound interface) or a keyboard (with MIDI interface). Edit (cut, paste, overlay, etc.) digitized sounds using menu driven tools. Compatible with model 500, 1000 and 2000 Amigas. **SUGGESTED RETAIL PRICE: $99.95**

ELECTRONIC COLOR SPLITTER MAKES RGB WHEEL OBSOLETE

Device takes the place of RGB wheel to capture color video from camera. Also gives you the ability to capture color video from VCR. Unit has RGB selector switch (for Digi-View users). With Perfect Vision, pictures are captured automatically in 1.5 seconds. Digi View takes 60 seconds and may not be compatible with some VCRs. **SUGGESTED RETAIL PRICE: $99.95**

```
// let the player pick up the toolbox //
v:get,take,grab
  n:toolbox
    if RM$ noun
      ty:okay!
      rm- noun
      in+ noun
      done
    endif
  nend
  ty:What do you want to get?
vend

// let the player hide the wookie if he's dead //
```

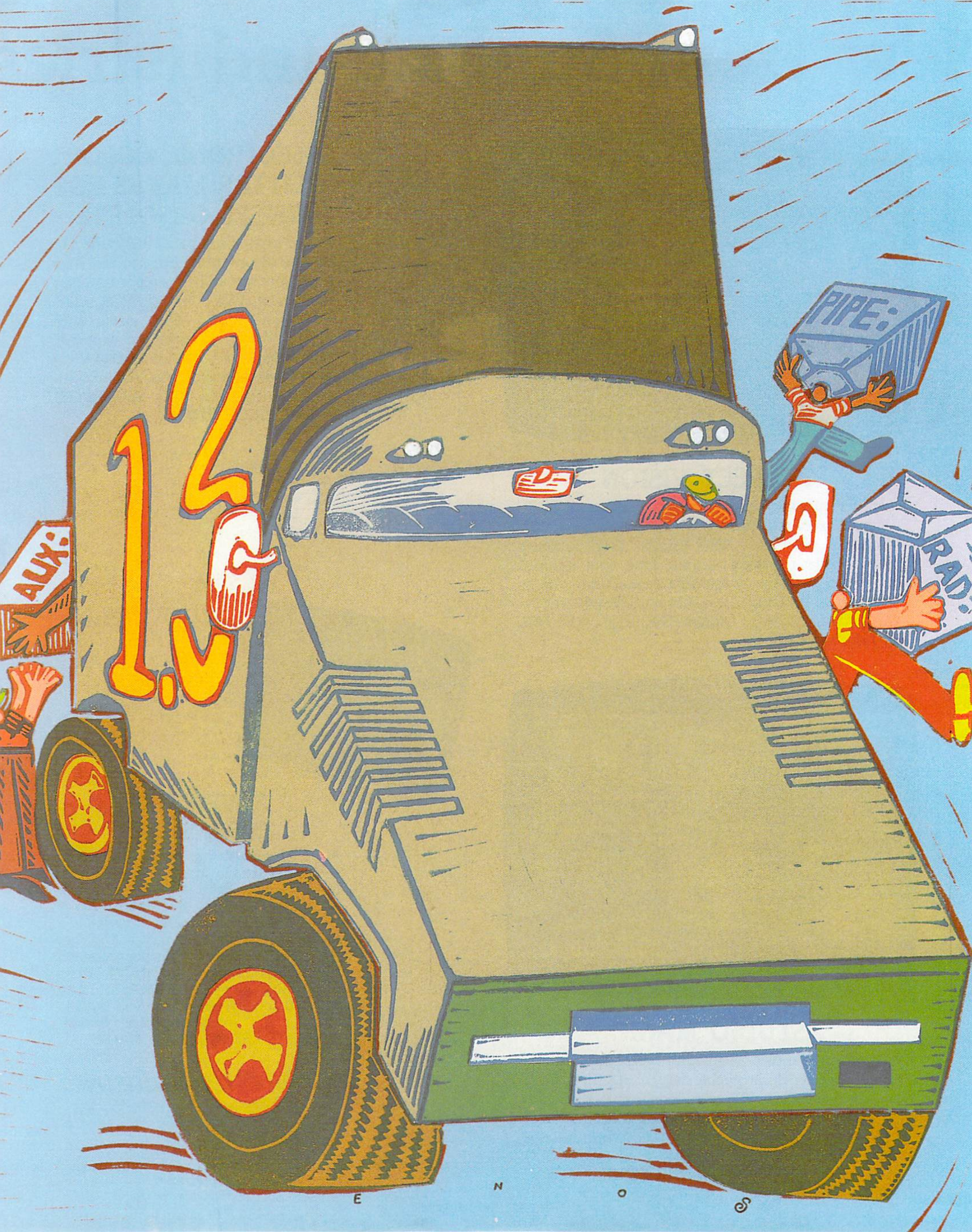


ADVENTURE WORKSHOP

A totally new idea in games: write your own adventures in an easy to learn adventure language. You create the sequences and the consequences. Your finished games can be saved and run again or traded to a friend. Comes with two complete games ready to play, manual with examples and suggestions, starter set of IFF icons (weapons, creatures, backgrounds), digitized sounds, everything you need to become a master game maker. **SUGGESTED RETAIL PRICE: $59.95**

SunRize Industries
3801 Old College Road
Bryan, TX 77801
(409) 846-1311.

Circle 157 on Reader Service card.


1.2
AUX:
PIPE:
RAD:
E N O S

THE 1.3 DEVICE SQUAD

With its many new device drivers and handlers, Workbench 1.3 will let you add a lot more hardware and software devices to your system than 1.2 did.

When left to its old devices, the 1.2 operating system's MOUNT command could handle simple peripheral operations adequately, but realized little of the versatility of the Amiga's system for adding devices. Used in conjunction with the Mountlist text file found in the DEVS: directory, the MOUNT command allows you to add almost any type of hardware or software device to the system.

Mountable device drivers let AmigaDOS interact with external hardware devices such as a hard drive. Devices may also consist merely of software drivers that use existing system resources in a new way, as with the RAM disk device. Mountlist describes various device attributes, and specifies the file that contains the device driver or handler software. Squandering potential power, the 1.2 release contained Mountlist entries for adding only the A1020 5¼-inch drive as an AmigaDOS device and a hypothetical device called AUX: (similar to the serial device).

With the release of Workbench 1.3, Commodore has harnessed much more of the MOUNT command's power, letting you add many standard device types to your system. For faster data access, Commodore added a recoverable RAM disk and Fast File System. The new PIPES: device and AUX: device let you talk to other commands and terminals, while the SPEAK: device talks back to you. In case you have trouble issuing the new commands, Commodore added a command-line editor.

Totally RAD:

Perhaps the most interesting of the new devices is RAD:, a second RAM device, which, like the familiar RAM: device, uses part of the computer's working memory as an electronic disk drive. Rather than replacing RAM:, RAD: complements it and has many important differences. RAM: is an integral part of the AmigaDOS system; you create the RAM: device merely by referring to it in an AmigaDOS command. To access RAD:, on the other hand, you must add it to the system with the MOUNT command, and be sure the file containing its device driver, ramdrive.device, is in the DEVS: directory. RAM: adjusts its size automatically, according to its contents; as you add more files, it grows. Unlike RAM:, whose size is limited only by the amount of available memory, RAD: has a fixed size you specify in the Mountlist entry you use to mount it.

Because it is of a fixed size, RAD: acts more like a floppy disk than a RAM disk. Like the standard 3½-inch floppy, RAD: is set up as a double-sided drive, with 512 bytes per sector, and 11 sectors per ►

By Sheldon Leemon

ILLUSTRATED BY RANDALL ENOS

track. Each track (also called a cylinder) uses 11K of memory (512 bytes per sector × 11 tracks per sector × 2 sides). AmigaDOS determines the number of tracks used for RAD: by the LowCyl and HighCyl entries in the Mountlist. An entry of LowCyl = 0 ; HighCyl = 21, for example, allocates 22 tracks, at 11K per track, for a total of 242K of memory, enough to store all of the files in the Workbench's C directory. If you have a couple of megabytes of fast memory on your Amiga, you could even set the HighCyl value to 79, for an 880K RAD: drive, the exact same size and layout as a floppy disk. With the RAD: drive the same size as a floppy, you can use DISKCOPY to copy an entire floppy to RAD:, or vice versa. You can even format the RAD: drive, which you can not do to RAM:.

The most important difference between RAD: and RAM:, however, is RAD:'s durability. Because both use the computer's memory to simulate disk storage, when you turn off the computer, you will lose the contents of both devices. A warm boot is another story. While RAM: loses its contents whenever you press the CTRL-Amiga-Amiga key combination, or you encounter a Guru error, RAD:, a recoverable RAM disk, protects its cargo. As long as the error that caused the Guru Meditation did not scramble the contents of memory, with the 1.2 Kickstart ROM you can mount RAD: again, and it will reappear with its contents intact. Not only can you recover the contents of the RAD: drive after rebooting, but also, with Kickstart 1.3, you can even reboot from the RAD: device. Along with the ability to boot from such devices as hard disks and network boards, the 1.3 ROM chip adds the ability to reboot from RAD:, provided that it has been mounted, and the operating system does not find a bootable disk in drive df0: at warm-start time. Even if it uses a boot disk for a warm start, Kickstart 1.3 restores RAD: automatically upon warm boot, so you need not remount it. Of course, if you have an Amiga 500 or 2000, you will have to change Kickstart ROM chips to gain this ability; if you own an Amiga 1000, however, you need only insert the new Kickstart disk.

With RAD:, a recoverable RAM disk, your files will survive a warm boot.



Move It Along

Because RAD: is a mountable device that can be formatted, it can also take advantage of the new Fast File System (FFS). Commodore added this alternate file-system handler to Workbench 1.3 to make hard-disk access faster, but, in fact, you can use it for any mountable disk device, except the 3½-inch floppy drives. Because the FFS stores data differently on disk than the normal AmigaDOS file system, 3½-inch drives using the new system cannot read current AmigaDOS disks. Non-removeable media, however, such as hard disks and RAM disks, do not face this problem.

To use the FFS on RAD:, you must add two items to the RAD: entry in the DEVS:MOUNTLIST file. Anywhere after RAD: and before the # that ends the entry, insert:

```
GlobVec = -1
FileSystem = l:FastFileSystem
```

In addition, you must make sure the FastFileSystem file mentioned in the second line appears in the l: directory on your Workbench disk. After you have changed the Mountlist entry, use the command MOUNT RAD: to mount the drive. Because you are using a different file system than the default, you must format the drive before you use it, but using the new QUICK option of the FORMAT command shortens the process:

```
:SYSTEM/FORMAT drive RAD: name Speedy
QUICK
```

Although using the FFS on the recoverable RAM disk speeds up operations somewhat, because it is a RAM drive, RAD: responds fairly quickly without it.

The Fast File System saves time, but at a price. Under Kickstart 1.3, you cannot reboot from the RAM drive if you format it with the FFS. In fact, with the 1.3 ROM, you cannot even recover the contents of the RAM drive when you reboot after formatting with the FFS, because the drive is automatically mounted on warm start as a normal DOS file-system device. As Kickstart 1.3 is expecting the RAM drive to be in the old AmigaDOS format, it thinks that RAD: is not a DOS disk. If you use Kickstart 1.2, however, you have built-in protection because the operating system requires you to mount the drive again after a warm boot. Even though you cannot reboot from the RAM drive, you can recover its contents even if it is formatted with FFS.

AmigaDOS Pipes Up

The PIPE: device handler on Workbench 1.3 emulates the pipes feature of MS-DOS that allows you to transfer the output of one program to the input of another. Let's say you want to display a large disk directory on screen, but do not like using DIR because it outputs file names in a continuous stream and does not pause when the screen fills up. By piping the output of DIR to the MORE program, which displays text one screen at a time, you get the information you want, in the format you prefer. In UNIX or MS-DOS, you would issue a command such as DIR | MORE. Because the Amiga command shell does not recognize the | operator, you must simulate pipes to achieve the same result.

As with Workbench 1.2, in 1.3 you can redirect files to a temporary storage area on the RAM: disk. To transfer DIR output to MORE, type:

```
DIR >ram:temp
MORE ram:temp
DELETE ram:temp
```

A more efficient method, especially for large files, is to mount PIPE:, whose handler is found in ►


A new release from Lattice who brought you the better C:
IT CAME FROM THE C
BORIS
AMIGA
STARRING LATTICE C++!
★ OBJECT ORIENTED. A FIRST FOR YOUR OBJECT ORIENTED AMIGA!
★ LIFE SPRINGS FROM YOUR SCREEN WITH THIS HIGHER LEVEL OF PROGRAMMING!
★ PRODUCE MORE RELIABLE PROGRAMS WITH FEWER KEYSTROKES & LESS EFFORT!
★ HIDE YOUR DATA TO PROTECT IT!
★ BUILD ONE TYPE ON ANOTHER TYPE!
★ DEFINE A GENERIC THEN REDESIGN SPECIFICS WITHOUT MAKING THE PROGRAM FAIL!
★ TRUE DATA ABSTRACTION TO AID IN PORTABILITY AND PROGRAM SIMPLICITY!
★ OVERLOAD OPERATORS AND FUNCTIONS! COMPLEX ARITHMETIC LOOKS LIKE PART OF THE LANGUAGE!
Now at a software supplier near you!
Lattice
Subsidiary of SAS Institute Inc.
Lattice, Incorporated
2500 S. Highland Avenue
Lombard, IL 60148
Phone: 800/533-3577
In Illinois: 312/916-1600
Lattice is a registered trademark of Lattice, Incorporated.
Amiga is a trademark of Commodore-Amiga, Inc.
Circle 23 on Reader Service card.

the file l:pipe-handler. The PIPE: device acts as a conduit, directing the output of one program to the input of another. One process writes to the pipe, assigning it an arbitrary file name (such as pipe:temp). Each pipe name uses a 4K buffer, which means only that much may be written to the pipe before the writing process is blocked. When the second program reads the 4K buffer (by accessing the same file as was written to), the first program can write 4K more of data, until all of the output is transferred. Once you issue the command MOUNT PIPE:, you could pipe the output of DIR to MORE with the command sequence:

```
RUN DIR >pipe:temp
MORE pipe:temp
```

Note that you use RUN to spin off a separate process for DIR. Both commands cannot use the same CLI process because if the directory output is larger than 4K, DIR will not terminate and give back the CLI prompt until MORE has read all of its output.

The roundabout method that PIPE: uses to simulate pipes may not be as simple as that available on other systems, but it does have some unique advantages. In addition to the traditional pipe transfer described above, you can use PIPE: for its buffering capabilities alone. Many terminal programs, for example, download files in a synchronous fashion. They receive a block of data, send it to the disk, wait until the disk write is finished, and then ask to receive the next block. Each intermediate disk write slightly delays the transmission. You can avoid the delay by downloading to a file in RAM:, but you run the risk of filling up the RAM disk before the file transfer is completed, or of forgetting to copy the file to a floppy before turning off your computer. A better solution is to use the command

```
COPY pipe:temp TO df0:downfile
```

before running your terminal program, and then downloading to the file pipe:temp. With this sequence you can buffer large amounts of data before any writes take place, meaning fewer delays. At the same time, you avoid the risks associated with downloading to RAM:. When the download process concludes, your file is stored safely on disk.



New AUX: and Squawks

If you need to transfer data to another terminal, you will appreciate the new AUX: device, whose handler is located in the file l:Aux-Handler. AUX: transfers data through the serial port, much like the SER: device; the difference is in the buffering. While SER: buffers its output, sending it out only after a 512-byte block has accumulated, AUX: provides unbuffered communication with the serial port. With the unbuffered AUX:, you can create a CLI window that uses the serial port for its input and output by mounting the AUX: device, and typing:

```
NEWCLI AUX:
```

This procedure lets you hook up another computer or terminal to your Amiga, and give AmigaDOS commands from the second machine over the serial port, or even over a modem. While you cannot, of course, run Intuition-based windowing programs on your remote terminal, you can use such CLI commands as DIR and INFO to gain information about the Amiga disks. With the TYPE command you can send files to the remote screen, where they can be captured to a buffer file. While serial-port CLI's do not exactly make the Amiga a multiuser system, they do come pretty close to it.

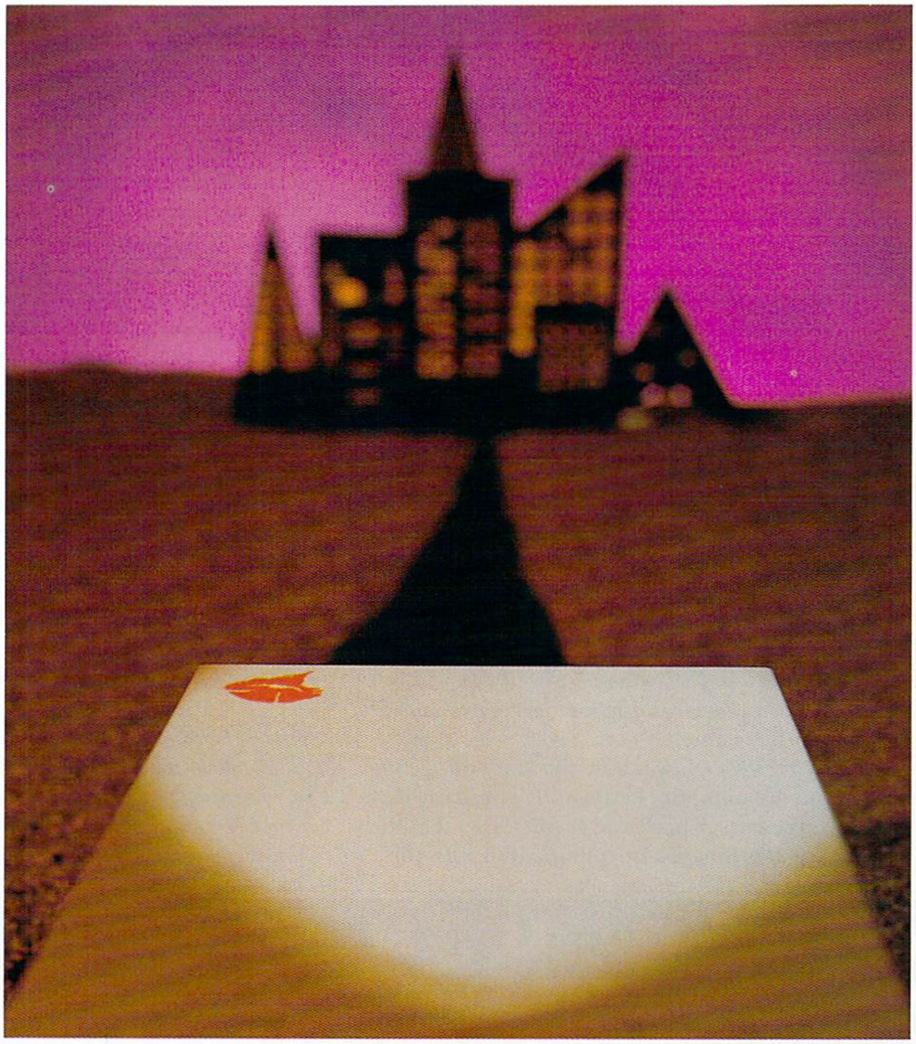
To make the Amiga's built-in speech synthesis more accessible, Commodore added the SPEAK: device handler to the 1.3 Workbench. SPEAK: is similar to the SAY program in the Utilities drawer, in that it converts text input into speech that is outputted through the audio channels. Like SAY, it uses the translator.library file from the LIBS: directory to convert the text to phonemes, and the narrator.device from DEVS: to output the phonetic speech. While SAY takes input only from the keyboard, you mount SPEAK: as a device, meaning it can take its input from any source that can write to a disk file. For example, you can save a file to SPEAK: from a word processor or even open SPEAK: as a capture file for a terminal program.

As with the SAY program, you can adjust SPEAK: to vary the output's sound. You can change the pitch and speed of the speech, choose male or female voice characteristics, and select natural or robot (monotone) speech inflection. To add a voice setting, you include it as part of a SPEAK:opts/ pathname when you access the device. For example, to listen to a file with a female voice at a pitch setting of 200, you could use the command:

```
COPY filename to SPEAK:opts/f/p200
```

The full list of voice options you can add to the SPEAK:opts/ pathname is shown below:

- P### Set Pitch (### is a number from 65 to 320)
- S### Set Speed (### is a number from 30 to 400)
- M Use male voice characteristics
- F Use female voice characteristics
- R Robot speech (uninflected monotone)
- N Natural speech (natural inflection)
- O0 Do not allow option settings in input stream
- O1 Allow option settings in input stream
- A0 Turn off phoneme input mode
- A1 Turn on phoneme input mode
- D0 Determine sentence breaks by punctuation alone
- D1 Determine sentence breaks from carriage ►



Very Low Power Consumption .22 Watts

TAKE A DRIVE INTO TOMORROW

Tomorrow's disk drive is here today. From CALIFORNIA ACCESS™ comes the CA-880, a powerful new 3½" disk drive for all Amiga® computers.

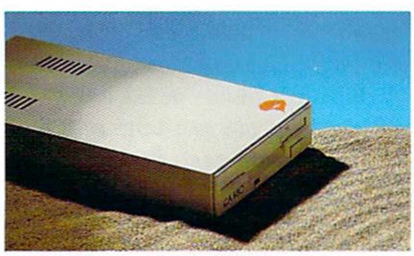
This highly reliable disk drive formats a 3½" double-sided, double-density diskette for 880 kilobytes of storage. The CA-880 is fully compatible with the Amiga 1010 disk drive, but offers much more. The CA-880 is half the size, is considerably quieter, and has an extra long cable.

The CA-880 also has a connector that allows you to attach an additional disk drive.

So why wait until tomorrow for what your computer needs today.

The CA-880 is yours for only $229.95 (suggested retail price).

For more information call (408) 435-1445, FAX (408) 435-7355, or write to Logical Design Works, Inc., 780 Montague Expwy., #403, San Jose, CA 95131.



CALIFORNIA ACCESS ™

Your Access to the Future

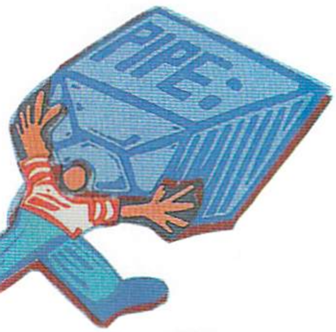
In Europe - Logical Design Works S.A., Geneva, Switzerland, Tel: 022/31 97 52, Fax: 022/32 75 04

Circle 73 on Reader Service card.

return and line feeds, as well as punctuation

A New Con Man

While your Amiga can talk to you, it cannot tell you how to fix an erroneous command. One of the major complaints about the CLI environment is that its console window does not support command-line editing. If you make a typing mistake in the first word of a command line, you have to erase the whole line and start over again.



A new 1.3 device called NEWCON: (similar to the shareware program ConMan) finally provides a console window that not only allows editing with the cursor keys, but also adds a 2K command-history buffer. After you mount the NEWCON: device, (whose handler is located in the file l:Newcon-Handler), you can open a CLI window that uses this new console device by typing:

NEWCLI NEWCON:x/y/w/h/name

where x and y specify the position of the upper-left corner of the window, w and h specify its width and height in pixels, and name designates an optional window name.

With a NEWCON: window, you can edit a command line by using the Left- and Right-Arrow keys to move the cursor back and forth across the line one space at a time, or in combination with the Shift key to take you to the beginning or end of the line. The up- and down-arrow keys implement a command-history feature. Each time you enter a command line, that line is stored in a 2K circular buffer. Pressing the up-arrow key retrieves the previous entry in the buffer, which appears at the command prompt. Pressing the down-arrow key moves you forward through the buffer. The shift-down-arrow combination takes you to the bottom of the buffer. If you don't want to step through each previous command, you can use the command history's search feature. Typing a partial command line, and then pressing shift-up-arrow, initiates a search for the last command line that matches the partial string.

While the original intent of the 1.3 Operating System was to provide enhanced printer support—as well as autobooting and faster access for hard drives—Commodore threw in a few extras. New devices like the recoverable RAM drive, the speech device, the pipes handler and the rest, increase the speed and extend the reach of your system at the expense of only a few commands. ■

Sheldon Leemon is the author of Inside Amiga Graphics *and other books, and he is a frequent contributor to many computer publications. Write to him c/o* AmigaWorld, *Editorial Dept., 80 Elm St., Peterborough, NH 03458.*

Amiga users ...

We make your life easier!

BeckerText Amiga

"...packages almost the same range of features (as WordPerfect) into a much smaller package"
Sentry May, 1988

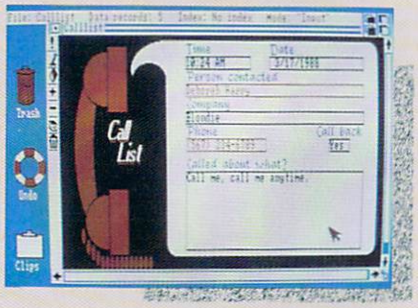


Here's a professional wordprocessor with features for both the beginner and the experienced user: easy to follow drop down menus, handy "shortcut" keys or fully user dependable function keys. BeckerText has advanced features such as automatic table of contents and indexes, multiple column printout with graphics, powerful fill-in-the forms capability includes both online "as you type" and expandable ElectraSpell spell checkers. Works with virtually any dot matrix, letter quality or laser printer. **$150.00**

TextPro Amiga—A full featured wordprocessor for users who may not need the professional features of BeckerText. **$79.95**

DataRetrieve Amiga

"DataRetrieve is THE database for the Amiga"
PLINK March, 1988

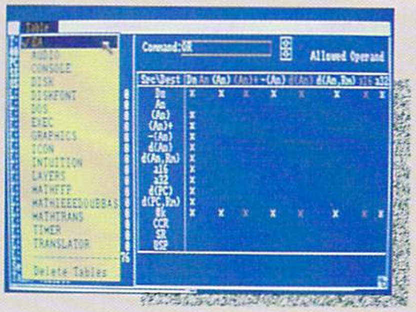


A simple-to-use, yet powerful data manager. The intuitive, quick setup will have you up and running in no time at all. You can customize the screen with different fonts, styles, colors and graphics. And DataRetrieve has powerful searching, indexing and reporting features. We mean it when we say that data management couldn't be easier. **$79.95**

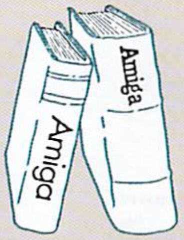
Available September

DataRetrieve Professional—Adds relational database capabilities and complete programming language for creating customized applications. Introductory price $195 until September 1st. **$295.00**

AssemPro Amiga



AssemPro has received rave reviews from machine language programmers in the know. It's a complete developer's package with a powerful editor, fast two-pass macro assembler with interactive error correction, advanced debugger with single-step and breakpoint capabilities, helpful tools such as disassembler and reassembler, 68010 support, complete online HELP and extensive library support. **$99.95**



Available Soon!

Amiga books from Abacus

Amiga for Beginners	$16.95
AmigaBASIC - Inside and Out	$24.95
Amiga Tricks & Tips	$19.95
Amiga Machine Language	$19.95
Amiga DOS Inside & Out	$19.95
Amiga System Prog. Guide	$34.95

YES! send me a free catalog of Amiga software and books

Qty.	Product	Price	Totals

In the USA add $4.00 for shipping. Outside USA add $12.00 per item, MI residents include 4% sales tax.

Total amount due ________

Payment: MC VISA Check Money Order ______ Exp. Date

Name: ________
Address: ________
City: ________
State: ______ Zip: ______ Tele: ______

Abacus

Dept. L7 • 5370 52nd Street SE • Grand Rapids, MI 49508

Orders only **1-800-451-4319**. For Technical assistance 1-616-698-0330 • Facsimile 1-616-698-0325 • Telex 709-101

Circle 124 on Reader Service card.

Amiga Makes It Possible . . .

SuperGen Makes it Happen!

Desktop Video.

Studio quality video production on a desktop. The Amiga makes it possible. The **SuperGen Genlock** makes it happen!

Video Professionals understand the power the Amiga Computer brings to the industry and the potential it has for enhancing their work. With its revolutionary hi-resolution graphics and processing power, the Amiga represents a sophisticated video production solution.

The SuperGen Genlock and overlay device is the link between the Amiga's video potential and your own video productions. SuperGen allows you to create and produce **professional broadcast quality video** with special effect graphics and titles created on your Amiga.

Some SuperGen™ features:

True Broadcast quality video output.
Real RS-170A. No ifs, ands or buts! Accurately locks to non-time base corrected signals such as VCR output. Very accurate RGB encoder for true Amiga graphic colors.

Two independent fade controls.
For external video through background and external video through graphics. Slider or software controllable.

Selectable Auto-Fade mode.
Amiga graphics black level fade. The black level of the Amiga graphics determine the fade level.

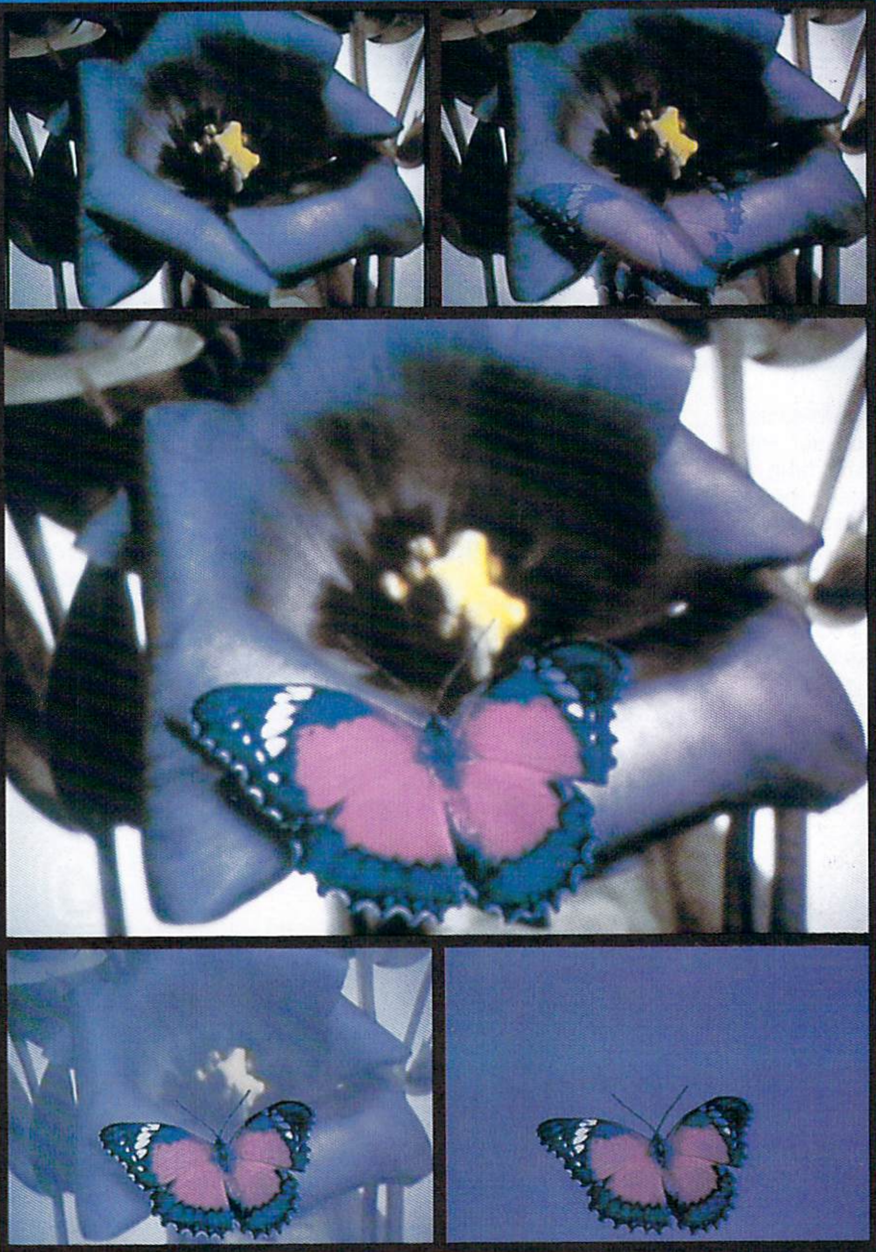
Switchable 3.58Mhz Notch filter.
helps eliminate chroma artifacts.

Selectable blanking.
Internal or external.

BNC Connectors.

A500, 1000, and 2000 compatable.

SuperGen™ $749.95
Professional Genlock
by Progressive Image Technology



Actual un-retouched photographs of composite video screens.
The flower is live video, the Butterfly is created on the Amiga.
SuperGen is overlaying the Butterfly onto the flower.
The top sequence shows Amiga graphics fading in.
The bottom sequence shows the Amiga background fading in.

To order or for more information Call:

(916) 344-4825

**1333 Howe Ave.
Suite 208
Sacramento, CA 95825**

Digital Creations

Circle 28 on Reader Service card.

Exploring AmigaDOS 1.3*

In the first episode of info.phile's "mini-series" on the new version of the Amiga's operating system, our columnists will take you on a backstage tour of 1.3's new CLI commands.

By Bill Catchings and Mark L. Van Name

**Editor's Note: To get the information on version 1.3 to you as quickly as possible, the authors have had to use a "gamma" version of AmigaDOS 1.3. A gamma version is one that Commodore circulates to developers and a few other groups so that those groups can see what's coming and help shake out any bugs. It is the last unofficial release before the software hits your dealer's shelves. Most likely, the final version will have the same new CLI commands as this gamma version,* but *Commodore still could make some changes before it releases the final version. To be safe, when you buy a copy of version 1.3, plan to spend a few minutes verifying that everything works as it is described here.*

THIS MONTH, INFO.PHILE begins a multi-part discussion of the new 1.3 version of the Amiga's operating system. Version 1.3 offers many new capabilities and improves many existing ones. There are new CLI commands, new utilities, improvements to existing commands and utilities, a new "shell" that lets you edit your CLI commands, the ability to make commands "resident" in memory so that you can access them more quickly, tighter integration of the often different Workbench and CLI environments, and many other improvements. Just a simple list of the new features would be extensive—and maybe intimidating!

In this series of columns, we will wade through that list a piece at a time, showing you the new capabilities and how to use them. We start here with an overview of most of the new CLI commands. We have left two of them, RESIDENT and XICON, until later when we discuss resident commands and the integration of the CLI and the Workbench, respectively.

Setting the Scene for a Command Performance

The new CLI commands provide a wide variety of capabilities. That's nice for us as users, but it makes a systematic presentation of them a bit difficult. So, please bear with us as we present them in a relatively arbitrary order.

Three of the commands help you use and manage your system more easily. If you have a hard disk, you can use the LOCK command to protect it from accidental damage. For example, you might be testing new public-domain software and want to be sure that no "virus" or other dangerous program can affect the data on your hard disk, or you might want to protect that data from the hands of your co-workers or children while you step away from your Amiga for a break.

Its format is simple:

```
LOCK <drive> ON | OFF
  [ <password> ]
```

Its use is also straightforward: Give the drive name, then ON to protect the drive, or OFF to turn off a lock that you set earlier. You can make releasing the lock a bit harder by providing the optional, four-character <password> when you turn the lock ON. Anyone who wants to turn it OFF must supply the same <password>. Once you lock a drive, it stays locked until you either unlock it or reboot your Amiga.

You actually can lock parts of a drive as well as the whole thing. If your drive has several partitions, you can give the name of any of those partitions as the <drive> parameter. This lets you protect some particularly crucial data on a drive while leaving the rest open to change.

There is one important restriction: LOCK only works on hard disks or hard-disk partitions that you have mounted with the new version 1.3 Fast File System. This new file system will make your hard disks run much faster, provided you mount them with it. AmigaDOS has traditionally been very slow locating files, but the new file system will stop making your hard disks wait on the AmigaDOS software algorithms and in- ►

stead let them run at their top speeds.

The Fast File System does not initially work on floppies. Before Commodore puts its support software into ROM, however, it is almost certain to support floppies. Don't worry too much about this restriction, however; the Fast File System is so much faster on hard disks than the old one that you will be very happy once you move to it.

Those of you lucky enough to have a battery-backed clock/calendar on your Amiga will be pleased with the new command, SETCLOCK. If you have an Amiga 2000, you have a clock as part of your Amiga's standard equipment. If you have an A500, your machine did not come with a clock/calendar, but several vendors offer relatively inexpensive ones. You also get one if you buy Commodore's A501 512K Memory Expansion Module. If, like us, you are working on the original Amiga 1000, you also can turn to several vendors for this fairly inexpensive addition. [For more information, see "The *AmigaWorld* Hardware Buyer's Guide," p. 48, in the March '88 issue, or "One Thousand One, One Thousand Two. . .Four Clock Calendars for the Amiga 1000," p. 18, in the September/October '87 issue.]

SETCLOCK works with the battery-backed clock/calendar and the system clock/calendar that you can set in Preferences. As with most CLI commands, its format is simple:

SETCLOCK LOAD | SAVE

If you specify LOAD, AmigaDOS sets the current system date and time to the time and date in the clock/calendar. If you specify SAVE, it goes the other way and sets the clock/calendar to the current system time and date.

This command makes a great addition to your startup-sequence file. Just put in the line

SETCLOCK LOAD

and your Amiga will boot with the system time set to the clock/calendar's time and ready to go. You can use the SAVE option for those rare occasions when most clock/calendars end up wrong, such as the days when we change in and out of daylight savings time.

If you try either form of this command on an Amiga that does not have a clock/calendar, your system may appear to be hung. It's not. Hit RETURN and you will get the message:

Internal clock not functioning

The last of the three general commands is FF:

FF [–0 | –n]

FF is a nifty little program developed by Charlie Heath of Microsmiths and included in 1.3 with that firm's permission. It speeds up the way your Amiga handles text, so that everything from typing files to flipping between screens with most editors will run faster.

If you give it the –0 option, or if you just enter it with no arguments, you turn on its faster text handling. It will give you a line crediting Microsmiths and then say

Turning on Fast Text

To turn it off, use the –n option. Although you will still see the credit line, there is no message telling you that it is off.

. . . And Now the Plot Thickens

Just about everybody can benefit from these first three commands. There are also four other new commands that are probably most useful to "power" users, although all of us may want to use them every once in a while.

The ASK command lets you ask a question and get a yes/no answer:

ASK <prompt string>

This command is useful really only in batch files, but it can be very helpful there. It displays the <prompt string> and then waits for either a Y or an N (or the lowercase versions of either of these), and then the Return key. Hitting Return without entering either Y or N is equivalent to entering N and then Return.

If you enter Y, ASK sets the CLI's command termination, or conditional, flag to 5, which is the value for a WARNing. If you enter N or nothing, it sets that flag to 0, which is the normal termination value. You can check the value of that flag in IF statements in batch files. The IF ERROR statement is true if the conditional flag is 10 or greater, while IF FAIL is true if that flag is 20 or greater. IF WARN is true if the conditional flag is 5 or greater, so you can use this IF version to test the result of an ASK command.

ASK is particularly nice when you want a batch file to check for a user's confirmation before it takes an action. For example, if in a batch file you want to check that a user really wants to delete a file before deleting it, you could use the following set of CLI commands. (All except the first command could go anywhere in your batch file. The first command, like all .KEY commands, must come at the start of the batch file.)

```
.KEY file_name
ASK "Do you really want to delete
  <file_name>?"
IF WARN
DELETE <file_name>
ECHO "<file_name> is gone."
ELSE
ECHO "You did not delete
  <file_name>."ENDIF
```

AVAIL is a technical command of a different sort. It takes no parameters. You simply enter

AVAIL

and it gives you a breakdown of all of the memory in your Amiga. In the middle of playing with these new commands on an Amiga 1000 with 512K of memory, we entered AVAIL and got the display shown in Table 1.

The term "chip" refers to the memory that your Amiga's three special video and sound chips can use. For now, this is the first 512K of your system's memory. Knowing the amount of available chip memory can be useful when you need to know how large an image or sound sample a program will be able to manipulate. "Fast" is the term for all of the rest of your Amiga's memory, which the spe- ►

Table 1. Sample display given by the AVAIL command.

Type	Available	In-Use	Maximum	Largest
chip	307304	208560	515864	304712
fast	0	0	0	0
total	307304	208560	515864	304712

cial chips cannot use. Because the A1000 we used has only 512K, AVAIL showed 0 in all of the Fast categories.

"Available" denotes the memory that is still available for programs to use, while "In-Use" indicates the memory that your executing programs are already using. "Maximum" is the sum of these two, the total amount of each type of memory in your Amiga.

The final category, "Largest," is one in which only programmers are typically interested. It is the biggest single chunk of the available memory, which is a limit on the size of the single largest thing that a program can put into memory.

The final two commands, SETENV and GETENV, let you manipulate a new CLI construct: environment variables. An environment variable is a container that can have a string as its value. You can set this value with SETENV and read it with GETENV. AmigaDOS commands can also use environment variables, and many of them will do so in the future.

AmigaDOS manages environment variables with the new ENV: handler. Actually, it *will* use that handler. Today it simulates that handler by storing these variables in a directory in your RAM: disk (RAM:ENV) and then using the ASSIGN command to set ENV: to that directory.

To set the value of an environment variable, you use SETENV:

SETENV <environment variable>
[<string>]

If you omit <string>, you set <environment variable> to the null string (""). You can retrieve the value of any environment variable with GETENV:

GETENV <environment variable>

For example, if you entered

SETENV my_data_directory
"df0:mydata"

and later typed

GETENV my_data_directory

the CLI would display

df0:mydata

If you ask GETENV to get the value of a nonexistent environment variable, it will respond

Can't get <environment variable>

An environment variable that you have never set is not the same as one that you have set to the null string with SETENV. If you do

SETENV my_data_directory

to set it to the null string, and then do

GETENV my_data_directory

the CLI will display a blank line.

In a future column we will discuss further environment variables and how CLI commands work with them.

These new commands are just the tip of the AmigaDOS 1.3 iceberg. Next time we'll crawl a little further down its surface and look at the many improvements it makes to existing commands.

Until then, try to grab a few spare moments and play around with this new release of the operating system. These new commands and its many other benefits will make you glad you did. ■

Bill Catchings and Mark L. Van Name are contributing editors to AmigaWorld. *Write to them at 10024 Sycamore Road, Durham, NC 27703.*

THE READERS' CHOICE



"HOW COULD HE be so positive/negative about such an awful/outstanding program? I could rate it better than that!" Go ahead, now's your chance to tell us what you think. For the past two years, we editors have applauded our favorite products with the Editors' Choice Awards. This year we leave the voting up to you. On the supplied coupon (or a postcard), rate your hardware and software over a scale of one (the lowest) to 10 for each of the three criteria (A, B and C) listed in the appropriate category. Send your votes to: The Readers' Choice, *AmigaWorld*, 80 Elm St., Peterborough, NH 03458.

In the December issue, we'll present the 1st Annual Reader's Choice Awards with all the pomp and glitter they deserve. However, unlike the Academy Awards who employ the prestigious accounting firm of Price & Waterhouse for their tabulations, *AmigaWorld*'s results are entrusted to the firm of Cutrate & Watergate, infamous for their security leaks. While they can count accurately, they can't keep secrets. In upcoming issues, watch for pre-ceremony peeks inside the envelopes.

CREATIVITY (graphics, video, music, desktop publishing)
A) ease of use
B) flexibility (special equipment needed, integrates with other programs)
C) professional features (Can you use it in your business/studio?)

GAMES
A) playability
B) presentation (graphics, sound)
C) longevity (How long does it hold your interest?)

HARDWARE (memory expansion, hard drives, digitizers, genlocks)
A) ease of installation
B) ease of use
C) technical support

HOME (educational, finance)
A) ease of use
B) documentation (complete reference, examples, tutorials)
C) flexibility (Does it have a variety of uses or will you grow out of it?)

PRODUCTIVITY (spreadsheets, databases, accounting, telecommunications, word processors)
A) ease of use
B) flexibility (import files from other programs, a variety of applications)
C) advanced features (Can you grow into the program?)

PROGRAMMING (languages, utilities)
A) documentation (complete reference, examples, tutorials)
B) flexibility (integrates with other libraries, routines)
C) advanced features (Will it support more complicated applications?)

MISCELLANEOUS (whatever is left)
A) ease of use
B) documentation (complete reference, examples, tutorials)
C) performance (Does it do what was promised?)

PRODUCTS	**RATING** A	B	C

COMMENTS ____________________

PRODUCTS YOU WOULD LIKE TO SEE REVIEWED ____________________

AmigaWorld's Summer

Win an Amiga 2000 Plus

YOU'VE NOW REACHED Part Two of the Treasure Hunt. If you answered the first 16 clues in Part One correctly, you're one-third of the way to a chance at the Grand Prize: an Amiga 2000 plus a Getaway Weekend to the treasure site (including luxury accommodations for two nights and round trip airfare) to collect the prize.

If you missed the first leg of the journey, you can order copies of the July '88 issue (and first set of clues) by sending $4.50 plus $1 shipping and handling per copy to *AmigaWorld*, Attn: Treasure Hunt Back Issue Orders, 80 Elm St., Peterborough, NH 03458, or call 800/343-0728. Be sure to specify you are on the Treasure Hunt, so you will receive your magazine in time to make the deadline.

Remember, all the clues are linked so you will need to solve each one before you can move to the next location. Decipher the clues correctly and at the end of the third set (contained in the September issue) you'll know the location of the buried treasure.

Be sure to save your answers to all the clues each month (you may need them). The exact *answer* to each clue will correspond to the word or words marked in italics. In the November issue we will publish the winner's name and the trail to the treasure with the answers to each clue in all three parts of the treasure hunt.

When you find the spot that X marks, you won't need a shovel to dig up the treasure. All you have to do is fill out the coupon (or a facsimile) accompanying the third and final set of clues. All entries must be received at the *AmigaWorld* offices by Thursday, September 15, 1988. Send your entry to *AmigaWorld* Treasure Hunt, *AmigaWorld*, 80 Elm St., Peterborough, NH 03458. Only one entry per return address will be accepted. The winner will be selected in a random drawing of all correct entries held on Friday, September 16, 1988. Listen for your telephone notification on Monday, September 19th. Confirmation will follow by mail. Have your bags packed for the Getaway Weekend (Friday, Saturday, and Sunday), October 21–23 or 28—30 depending on your schedule.

The odds of winning will depend on the number of correct entries received. If the prize is not claimed, a second drawing will be held to award it. Taxes and duties on all prizes are the sole responsibility of the winner. Prizes are not transferrable, nor are they redeemable for cash value.

No purchase necessary. All federal, state, and local laws apply. Void wherever prohibited by law.

Anyone of any age may enter. Minors must be accompanied by parent or legal guardian to claim the prize. If the winner resides outside the US or Canada, the Amiga 2000 prize will be shipped to the winner at our expense. There will be no Getaway Weekend in this case.

Employees of IDG Communications Inc., its affiliates, subsidiaries, advertising and promotion agencies, and their families are not eligible to enter.

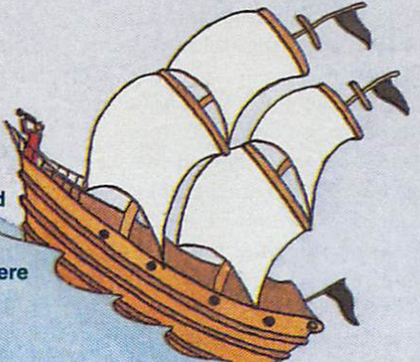
Entry constitutes permission to use the winner's name, photograph, or other likenesses for promotional purposes without further compensation to the winner. Submissions become the property of *AmigaWorld* and cannot be returned. *AmigaWorld* is not responsible for lost, misdirected, or late mail. All entries received after September 15 are void and ineligible for the drawing.

The winner and his or her companion assume all risks and dangers incidental to traveling to and from the site of the Getaway Weekend and to their stay during the Getaway Weekend, and agree that *AmigaWorld*, and IDG Communications Inc. and its affiliates, are not liable for any injuries, loss, or other mishaps suffered during the period specified above.



'88 Treasure Hunt

A Getaway Weekend for 2



The Clues—Part Two

17. What do Alfred Hitchcock, Cary Grant, and several American presidents have in common? Proceed appropriately to an *interstate* and take Greeley's advice.

18. Pass "Bill's" city and go to a town whose namesake is famous for a celebrated "bon voyage" in 1940. Do what they did then, and look for a *town* whose name is similar to their destination.

19. To find your next route, proceed in a boreal direction and think of what Bill Terry, the last of his kind, did during 1930. Proceed in "Mae's" direction, cross the border, and go to the first major *city.*

20. Leave town by the "dyslexic prospector's" route in the same direction and proceed to the *"Cereal City."*

21. Go "Dixie" on the first available interstate and take it to the city where it ends. Leave town in the "melted witch's" direction by the route whose number is the ASCII code for J. Cross a state line. Play some rugby (Union) as you proceed: Score a try and make the conversion. Add these to your present route to find your new *route.*

22. Cross a state line. Go to a place where Thelonius and Art might feel at home. From this "origin," travel up the *y-axis.*

23. Cross the next state line and begin looking for your next route. Burglary is the clue: How much territory did Lou Brock obtain each time on 938 occasions in his career? Ride off into the sunset on the appropriate *route.*

24. Cross two state lines. Feeling guilty about all this thievery, go into the darkness and find the *place* where the person who "made you do it" might reside.

25. Return to the route you were on at the beginning of Clue 24 and proceed in the same direction. Unfortunately, your computer is now bewitched with errors. You've got an "undefined label" and you "can't CONTINUE." But if you add the Amiga Basic code values for these, you can find a new *route* to get back on track.

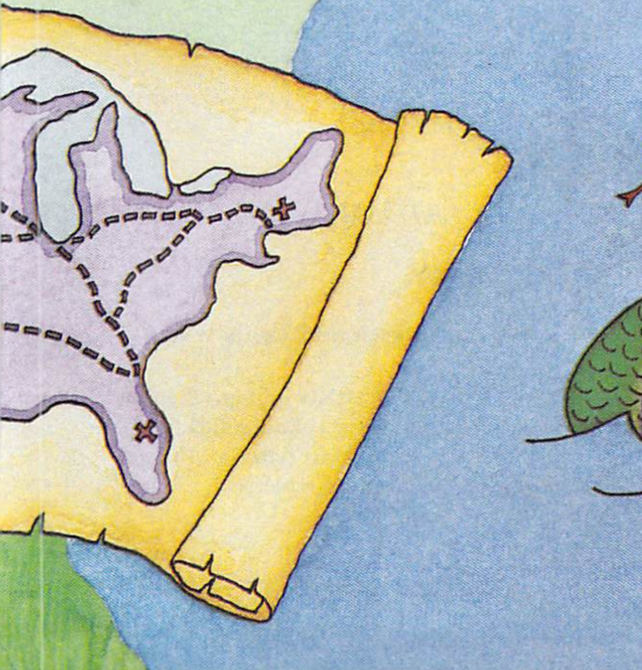
26. Proceed down state, pass through a "ghost town," cross a state line, and look for salvation in a *divine place.*

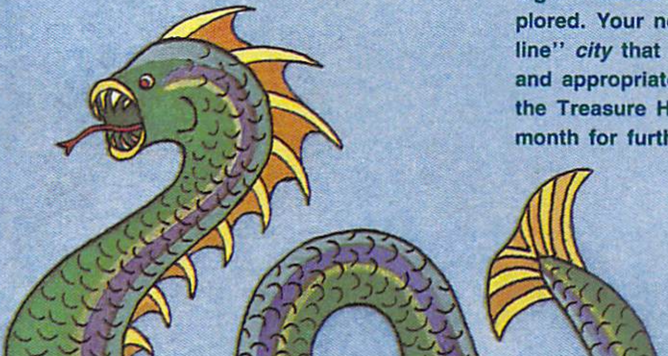
27. You leave this place in a state of ecstasy by the same route in the same direction. But soon you're in trouble—you've run aground. In fact, to put it slangly, you're really "in da dirt." But if you unscramble the letters in that slang phrase, you'll find your next *destination.*

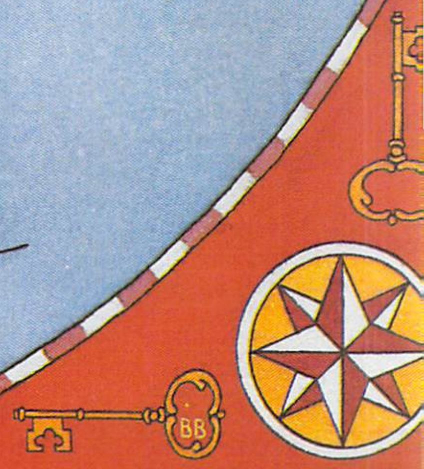
28. Leave here by Route 10100000 and proceed in a direction that is an essential ingredient of beer minus the first letter. Cross a state line and look for a *town* that is also the name of a book chronicling the exploits of Steve, Leo, and Moll.

29. Mimic birds in springtime and proceed from here on a little two-bit road. To find your next *route,* double your stake and go back to making beer.

30. To find your next route, begin at "square one" for the first digit. Add the square root of four to the first digit to get the second digit. Add the cube root of eight to the second digit to get the third digit. Proceed in the direction Scott explored. Your next destination is an "on-line" *city* that is also the end of the line, and appropriately the end of Part Two of the Treasure Hunt. Wait here until next month for further instructions.







from p. 22

If that isn't enough, an excellent companion to the Wrap-On feature called LUM shines light across the surface-mapped brush to give it a real three-dimensional feel. The LUM controls allow you to set the intensity and direction of the light source, and although setting the controls takes some getting used to, the result is well worth it.

Blend, found under the Mode menu, is similar to Digi-Paint's Tint mode in its ability to overlay colored light on the area being painted. The transparent wash subtly alters every color beneath it. Photon Paint takes this one step further by supplying a "Set. . ." Blend control window that lets you determine the tint's intensity, as well as the degree and direction of gradation and dithering. By manipulating the controls in this window you can create a color overlay that is nearly invisible at the edges, and intensifies toward the center (or any other point), until it's nearly opaque. The flexibility and versatility of this control is almost infinite, and it works with any brush or drawing tool.

An Integral Part

Photon Paint is excellent. It's probably not the only paint program you'll ever want, though. The developers have incorporated all of the basic tools to make Photon Paint a true HAM-paint program, but because it is HAM, there are minor problems. When you choose a standard brush from the toolbox, you can't see it on screen until you actually start painting. If you are involved in a precise operation and you're using a large round brush, for example, you see only a crosshair on screen until you press the mouse button—and then it's too late. Another HAM-related difficulty is speed. Photon Paint claims real-time operation of freehand drawing tools, but if you move the brush swiftly, the stroke lags behind the cursor. In fact, Photon Paint is overall a bit slower than I expect a paint program to be, both in terms of operations and calculating.

Photon Paint is an essential part of the ideal Amiga graphics studio. For starting a picture from scratch (no digitizing or image imports) I'll still want DeluxePaint II's speed and practical tools and I'll rely on Digi-Paint for its colorizing techniques and Rub-through feature. Photon Paint is the program I'll use to bring all the elements together and realize the full potential of Amiga graphics. If only it would print out on canvas. . . .

Photon Paint
MicroIllusions
17408 Chatsworth St.
Granada Hills, CA 91344
818/360-3715
800/522-2041
$99.95
512K required.

flickerFixer

Visionary improvement for the Amiga 2000.

By Douglas F. Watt, PhD

I WAS SO impressed by the A2000's numerous other virtues that at first I overlooked the small video slot in the back-right corner of the motherboard. Thankfully though, MicroWay did not. They have employed this slot to literally transmute the Amiga's video display, via the FCC Class B-approved flickerFixer video buffer card. flickerFixer banishes hi-res flicker and visible scan lines. The result? Well, compare the difference between night and day.

flickerFixer takes existing video output, buffers it, then adds the output from the next set of 200 scan lines if the output is interlaced (or fills in the other 200 lines with the same information if not), and sends that 400-line composite out at a 60Hz rate. By contrast, the standard interlaced display refereshes at a rate of 30Hz, which is inadequate given that the screen generally decays in one-fiftieth of a second. flickerFixer does not alter the stock Amiga video signal in any way, and except for the fact that you cannot use a genlock concurrently, it is completely transparent. It even allows you to use the normal video output and monitor simultaneously.

The combination of no scan lines in any mode and the total absence of interlace flicker—even in stark black-and-white high resolution—is impressive. flickerFixer is a help for desktop publishing and CAD-CAM Computer-Aided Design, Computer-Aided Manufacturing) applications, as well as hi-res and HAM (Hold-and-Modify) interlace painting. flickerFixer makes working in the normal 640 × 200 Workbench mode more enjoyable because it fills in the scan lines to produce solid characters, thus reducing eye strain. It is leagues ahead of the sunglasses antidote and the various screens that fit over your monitor, not only in effectiveness, but in price as well.

The card lists for $595. Because flickerFixer's near-industry-standard scan rate of 31.5MHz is not compatible with the Amiga 1080, 1084, and 2002 monitors (which run at about 15MHz), you'll also need a good multisync or VGA monitor, which cost between $425 and $800. (flickerFixer's designer opted for the high scan rate because the lower rate significantly limits resolution.)

With flickerFixer and a VGA or multisync monitor that has a reasonable adjustment range, you can get a full Workbench screen of 740 × 470 pixels (something that is hard to do with an Amiga monitor) using the public-domain program MoreRows. On the flip side, you may not be able to get the stock Amiga output to cover the full face of some monitors unless you're willing to experiment with the potentiometers on the internal monitor board. If in doubt about the compatibility of flickerFixer with a monitor, call MicroWay.

If you can't afford to buy it, I wouldn't recommend trying flickerFixer; it will only leave you depressed when you have to go back to your old display.

flickerFixer
MicroWay
PO Box 79
Kingston, MA 02364
617/746-7341
$595
No special requirements.

AProDraw

An old CAD and graphics pro, Amiga style.

By Gary Ludwick and Louis Wallace

THERE'S SOMETHING unnatural about drawing a picture by rolling a little ball around a desktop. Maybe that's why man invented the graphics tablet.►

GO AMIGO!™

THE WORLD'S LARGEST DISTRIBUTOR OF AMIGA™ PRODUCTS

HARDWARE SPECIALS

SCSI Hard Cards

- Takes up one A2000 slot
- Does not use drive bay
- AutoBoot with 1.3 • DMA

30MB: **$749** 50MB: **$899** *Other Sizes Available.*

Panasonic Printers

1080i Mk. II: $179 *While they last!*

~~**1091i Mk. II: $199**~~ *Sold Out!*

No additional purchase required.
Price includes UPS ground shipping.

GVP GREAT VALLEY PRODUCTS

IMPACT A2000 SCSI/RAM CARD

- Will autoboot with 1.3 • Compatible with Fast File System
- Up to 2MB RAM • We have SCSI Drives from 20–60MB

CALL FOR CURRENT PRICE!

Why buy from GO AMIGO?

- Three Years in Business
- Amiga Only
- Largest Inventory
- Published Policies
- Fast Shipping
- Mainframe Order Processing System
- Latest Versions
- Competitive Pricing
- Outstanding Service
- Non-Commission Sales Staff
- No Credit Card Surcharge

HARDWARE...HARDWARE...HARDWARE...HARDWARE

A-SQUARED
- New! Live! A1000 ... $259
- New! Live! A500 ... Call

ACCESS ASSOCIATES
- Alegra 512K ... Call

AMAZING DEVICES
- Time Lord ... $ 34
- Programmer's Reference ... $ 15

AMICORE
- New! Transvestor 2500 ... Call

ANAKIN
- Easyl ... $399
- Easyl 500/2000 ... Call

ANCHOR AUTOMATION
- Omega 80 ... $165

APPLIED VISIONS
- Futuresound ... $144

ASDG
- 8MB Board ... *In Stock!*
- RAM Boards/Boxes ... Call
- Satellite Board ... Call

AVATEX
- 1200HC Modem ... $115

BYTE BY BYTE
- Byte Box for the A500/A2000 ... *In Stock!*
- TIC ... $ 49

C. LTD.
- C View Cables ... $ 39
- Timesaver ... $ 64

CREATIVE MICROSYSTEMS
- Kickstart Eliminator ... $109
- RF Modulator for the A500 ... Call
- New! Video Interface for the A2000 ... Call

CSA
- New! Bernoulli Boxes ... Call
- New! Over 30 Board ... Call
- New! 68020 Boards for All Amigas ... Call
- New! Turbo Hi-Rise ... Call

DIGITAL CREATIONS
- SuperGen ... Call

ECE
- MIDI-500 ... Call
- New! MIDI-A1000 ... $ 58
- New! MIDI-A2000 ... $ 58

EPSON
- EX-800 ... Call
- New! *All models available* ... Call

EXPANSION TECHNOLOGIES
- New! Escort 2 ... Call
- Escort 500 ... Call
- New! Escort Hard Disks ... Call
- New! External 3.5 Drive ... $174

FINALLY TECHNOLOGIES
- Hurricane Accel. ... Call *works w/ A500, 1000, 2000*

FUJI
- 10 D-S Disks ... $19.99

GO AMIGA
- Disk Head Cleaner ... $ 15
- 30-Disk Case ... $ 10
- New! ImageWriter II Cable ... Call
- Printer Cables ... $ 25
- Modem Cables ... $ 25
- Mousepad ... $ 10
- Sony Monitor Cable ... $ 35
- New! Switch Boxes ... Call

GOLDEN HAWK TECH.
- MIDI Gold ... $ 69

GREAT VALLEY PRODUCTS
- New! A500 Interface ... Call
- SCSI Controllr w/ RAM ... Call

HYPERTEC
- New! Deluxe MIDI Interface ... $ 74

INKWELL
- Light Pen ... $ 99

KETEK
- A500 Command Center ... Call
- New! Command Ctr. Deluxe ... Call

LOGICAL DESIGN
- New! CA-880 3.5'' Drive ... $185

MICHIGAN SOFTWARE
- A500 Expansion ... Call
- Drive Ext. Cables ... Call
- Insider ... Call
- Multi-Start ... Call
- Quickstart ... $149

MICROBOTICS
- A2000 Adapter ... Call
- A2000 Products ... Call
- Multifunction ... Call
- Starboard 2MB ... Call
- Starboard2/A500 ... Call
- *Other Sizes Available*

MICRON TECH
- 2MB for A2000 ... Call
- New! A1000, A500 Boards ... Call

MICROWAY
- Flicker Fixer ... Call

MIMETICS
- AmiGen Genlock ... $157
- Audio Digitizer ... Call
- Frame Butter ... Call
- MIDI Interface ... $ 45

NU-DATA
- New! External SCSI Drives ... Call

OKIDATA
- Oki20 Col. Ribbon ... $ 8
- Oki20 Blk Ribbon ... $ 7
- Okimate 20 with Plug n' Play ... $199

PACIFIC PERIPHERALS
- OverDrive ... Call
- SubSystem ... Call

PANASONIC
- Camera/Lens for DigiView ... Call
- New! Variable Iris Lens ... Call
- 1080i Mk II Printer ... $179
- 1091i Mk II Printer ... $199

PHOENIX
- A500, '1000 H-Drives ... Call
- CPS500 Pwr Supply ... $ 84
- New! Sonic Speakers ... $ 89

PROGRESSIVE
- New! Frame Grabber ... Call
- ProDrive External ... $189
- ProDrive for A2000 ... Call
- ProGen ... Call

SCI-TECH
- GenKey ... Call

SPIRIT TECHNOLOGIES
- 1.5MB for A1000 ... Call

SUN-RIZE
- Perfect Sound ... $ 69
- Perfect Vision ... $189

SURFSIDE COMPONENTS
- New! Master 3A 3.5'' Drive ... $178

SUPRA CORPORATION
- 2400B Modem ... Call
- Hard Drives ... Call

WICO
- New! Trackball ... $ 39

XEROX
- 4020 Color Ink Jet ... Call

ELECTRONIC ARTS SOFTWARE

- Aaargh ... $25
- Adventure Construction Kit ... $19
- Alternate Reality ... $29
- Archon ... $19
- Archon II ... $19
- Arctic Fox ... $26
- Arts Part I ... $19
- Arts Part II ... $19
- Awesome Arcade Pak ... $36
- Bard's Tale ... $32
- Battle Droidz ... $26
- Black Cauldron ... $29
- ChessMaster 2000 ... $30
- Deluxe Music ... $63
- Deluxe Paint II ... $84
- Deluxe PhotoLab ... $74
- Deluxe Print II ... Call
- Deluxe Productions ... $144
- Deluxe Video 1.2 ... $84
- Donald Duck ... $19
- DPrint Data Disk ... $25
- Earl Weaver Baseball ... $35
- Empire ... $36
- Ferrari Formula 1 ... $36 *In Stock!*
- Financial Cookbook ... $19
- Golden Oldies ... $19
- Gridiron ... Call
- Hot & Cool Jazz Disk ... $24
- Hunt for Red October ... $36
- Instant Music ... $32
- Instant Music Data ... $25
- Intellitype ... $35
- King's Quest 1,2,3 ... Call
- Lounge Lizards ... $38
- Mad Libs ... $16
- Marble Madness ... $32
- Mavis Beacon Teaches Typing ... $33
- Mother Goose ... $23
- New Tech. Color Book ... $17
- One on One ... $19
- Pub Games ... $26
- Quizam ... $25
- Reach for the Stars ... $33
- Return to Atlantis ... $36
- Roadwars ... $26
- Rockford ... $26
- Seasons & Holidays ... $23
- Seven Cities of Gold ... $19
- Skyfox ... $19
- Skyfox II ... $29
- Space Quest II ... $37
- Starfleet I ... $36
- Thexder ... $26
- Winnie the Pooh ... $26

Current Specials: **FREE** 1986 Teams Disk with Earl Weaver
INTERCEPTOR — HERE NOW!

NEW PRODUCTS ARRIVE DAILY!

Circle 26 on Reader Service Card

Summagraphics is no newcomer to the graphics tablet field, having produced a variety of such devices over the last few years. Until recently, however, Amiga owners were out in the cold if they wanted a Summagraphics tablet, because no software drivers were available. R&DL Productions now packages Summagraphics MM series tablets with Amiga drivers for both freehand-drawing and CAD (Computer-Aided Design) applications in the form of AProDraw.

The tablet, finished in Amiga-coordinating beige vinyl, comes parceled with a stylus for drawing applications. A four-button mouse with clear-plastic cross-hair sight is available as a $50 option for CAD users. *(Note: For the purposes of this review, Gary Ludwick, our graphics-tablet expert, tested AProDraw on his A1000. Using the CAD mouse, Lou Wallace then evaluated it from the CAD perspective on his A2000.)*

Double Double

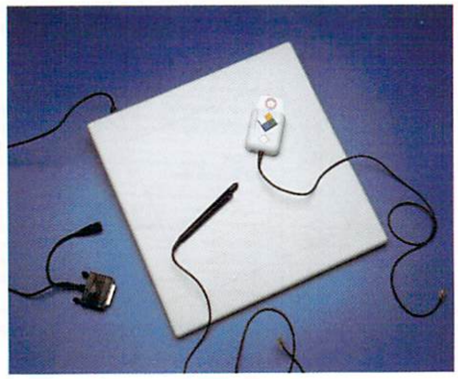
Not only is the tablet available for two different applications, but in two sizes as well. You need plenty of desk space to accommodate the 16 × 16-inch tablet; the smaller one is 9 × 6. Each unit comes with its own power supply, and hooks up to the Amiga via the serial port (although providing no pass-through connector). The A1000 requires a gender changer for connection (which R&DL thoughtfully provides), and the cable plugs directly into the A500 and A2000. While the large connector presents no problems on the A500, you must remove one of the audio plugs to accommodate it on your A2000 (a minor problem unless you need both sound channels).

The SummaDriver software, which intercepts mouse signals, is easy to install via Workbench or CLI. It provides four utilities, including a configuration table (that allows you alter the tablet's aspect ratio) and three working modes: default (640 × 200), hi-res interlaced, and low-res (320). Those with non-standard Amiga systems, particularly third-party monitors, will need these configuration choices, but most people won't. The package comes optimally configured for the Amiga and as such it's pretty much a plug-in-and-use system.

AProDraw's sliding easel back is unique and particularly useful; it allows you to set the angle from flat to about 30 degrees. Unlike the Easyl tablet, however, the rectangular version works only in the landscape (horizontal) orientation; there is no portrait (vertical) option. The larger tablet, of course, works in a square format.

On the Draw

Offering a two-button wired stylus with electronic pickup, AProDraw occupies a previously-unfilled niche. The tip of the stylus functions as the left mouse button; pressing it against the tablet engages it. You can replace the nylon tip with a ball-point-pen refill, tape a piece of paper to the tablet, and work in the conventional manner. For many artists this is an important consideration—it's all a matter of where you look while you draw. The right mouse button is on the barrel of the stylus.



The 16-inch tablet with serial connector, stylus, and CAD mouse.

AProDraw also works in the single-handed style to which mouse users are most accustomed. Like the mouse, the on-screen cursor will follow the relative position of the stylus as long as it is in close proximity to the tablet. With DeluxePaint II (Electronic Arts), cursor and screen action were smooth and well controlled. (R&DL says that the unit performs fastest with DeluxePaint II versions 2.1 and later.)

Can You Do the CAD/CAM?

The four-button mouse cursor is suitable for precision CAD work. The crosshair function lets you digitize drawings directly into your CAD program by overlaying them on the tablet. Two of the buttons work as the standard mouse buttons. The other two are inoperable; they are not needed in the Amiga configuration.

The CAD test consisted of putting AProDraw through its paces with six dif- ►

ferent CAD programs: Aegis Draw Plus (Aegis), Dynamic CAD (MicroIllusions), IntroCAD (Progressive Peripherals), LogicWorks (Capilano Computer Systems), PCLO (SoftCircuits), and X-CAD (Taurus-Impex). Each worked as expected, and movement seemed precise, although one small quirk did manifest itself. On several occasions the driver became inactivated and control passed back to the regular mouse. This was not fatal, as it was possible to save the work in progress, exit the program, and restart the tablet. What caused this, however, remains a mystery; no particular keystroke combination or specific mouse activity seemed to be responsible for triggering the driver problem.

Test Drive

AProDraw is potentially valuable for Amiga artists and CAD professionals, but you might do well to try it with your software, especially if yours is an older package. Because so many more personal and ergometric considerations are involved with tablets than with other hardware pieces, you need to test drive every available unit before making a purchase decision. The R&DL packages are excellent systems—well designed and smooth functioning. Make this system a "must try" if you are considering such a device.

AProDraw
R&DL Productions
11-24 46th Avenue 2A
Long Island City, NY 11101
718/392-4090
$449 (9″ × 6″)/$549 (16″ × 16″)
(CAD cursor $50)
No special requirements.

Impact A2000 SCSI/RAM Hard Disk Controller

One slot does double duty.

By Louis R. Wallace

TWO OF THE most popular expansion devices for the Amiga 2000 are memory cards and hard drives. Great Valley Products addresses both these needs on one card by combining a hard-drive controller with expansion RAM on the Impact A2000 SCSI/RAM board.

The card I reviewed was populated with one megabyte of RAM, but you can buy the Impact board unpopulated and add memory in 512K increments. A jumper, which you must set to the proper RAM configuration, is included. Both the RAM and controller autoconfigure.

One connector is available for an internal SCSI (Small Computer System Interface) hard drive, and an external, Macintosh-pin-compatible connector will join up to seven SCSI devices. The board also has empty ROM sockets to which you can add ROM chips containing the 1.3 operating system and 1.3 Kickstart. With 1.3, your A2000 can bypass Workbench and boot automatically from your hard drive—an essential for those who believe the Amiga must autoboot to be considered a "real computer."

Hop On Board

Installation is simple; just open your A2000 and plug the board into any empty slot. The 28-page manual describes the procedure fully but lacks diagrams. If you do not have experience installing hard drives, you may want to get help.

Once the controller is in place, you must prepare the drive for use. The supplied software does that for you; it prepares and formats your hard drive, and then creates a Workbench disk with the proper Mountlist and a startup-sequence to activate the hard drive and turn control over to it on bootup. While this system works fine for AmigaDOS, the software does not contain options for preparing the drive with the 1.3 Fast File System.

One essential characteristic of any device you plug into your Amiga is compatibility with currently installed components. When I first set up the Impact board and 40-megabyte Miniscribe SCSI drive, I had problems. (I have a two-meg RAM board, a Commodore A2090 controller, and a Seagate ST251 40MB hard drive.) I was able to install the SCSI drive properly, and the RAM auto-configured without a hitch, but when I attempted to use both the A2090 and the Impact board, a variety of read errors on the SCSI drive resulted. Worse yet, using any RAM-intensive software brought me face to face with the Guru. The engineer at Great Valley Products determined that I had an early ►

When you want to talk Amiga...you want to talk to us.

MONITORS

AMDEK
- 410 A/W/G 169.00
- Color 600 Hi-Res RGB 349.00

MAGNAVOX
- 505 RGB/Comp/Analog 199.00
- 8762 RGB/Comp/Analog 279.00
- 873 Multimode 489.00



THOMPSON 4120 RGB/Comp Analog $239

NEC
- Multisync Plus 1099.00

THOMSON
- 4160 RGB/Comp/Analog 319.00
- 4375M Ultrascan 529.00

"Call for Custom Cables"

HARD DRIVES



SUPRA 20 MB (A2000) $619

C.LTD (500, 1000, 2000)
- 33MB (2000) 899.00
- 44MB (2000) 1199.00
- 50MB (2000) 1229.00

Call for 500/100 Prices

MINISCRIBE
- 20MB 3½" 40MS 349.00
- 20MB 3½" 65MS 319.00

SUPRA (500, 1000, 2000)
- 20MB (2000) 619.00
- 30MB (2000) 699.00
- 60MB (2000) 1349.00

Call for 500/1000 Prices

MODEMS

ANCHOR
- Volksmodem 12 300/1200 . . . . 99.99
- Signalman Exp. 1200 ext. 199.00
- Omega 80 300/1200 . . . . 119.00

HAYES
- Smartmodem 300 . . . . 139.00
- Smartmodem 1200 . . . . 299.00
- Smartmodem 2400 . . . . 459.00

NOVATION
- Parrot 1200 . . . . 119.00

PRACTICAL PERIPHERALS
- 1200 External 139.00

MEMORY EXPANSION

ACCESS ASSOCIATES
- Alegra 2MB . . . . CALL
- ALegra 512K . . . . CALL
- Autopal Expander 29.99

C.LTD



ALEGRA 512K CALL

SPIRIT TECHNOLOGY
- A500 1.5MB W/OK 289.00
- A1000 1.5MB W/OK 299.00
- Clock Opt A500 Board 39.99

DISKETTES

MAXELL
- MD2-DM DS/DD 5¼" 9.49
- MFD2-DDM DS/DD 3½" 19.49

SONY
- MD2D DS/DD 5¼" 9.49
- MFD-2DD DS/DD 3½" 19.49

PRINTERS

BROTHER
- M-1109 100cps Dot Matrix 179.00

EPSON
- LX-800 150cps; 80 col. 179.00
- FX-86E 240cps; 80 col. . . . . Call
- FX-286E 240cps; 132 col. . . . . Call
- LQ-850 24 wire 80 col. . . . . Call

OKIDATA
- Okimate 20 Color 129.00
- ML-182 + 180cps, 80 col. 249.00
- ML-320 + 300cps,; 80 col. 369.00

PANASONIC
- KX-P1080i 120cps, 80 col. 175.00
- KX-P1091i 194cps, 80 col. 199.00

STAR MICRONICS
- NX-1000 144cps, 80 col. 179.00
- NX-1000 Rainbow Color 249.00
- NX-15 120cps, 132 col. 319.00

PRINTER CABLES
- A1000 to Parallel 12.99
- A500/2000 to Parallel 12.99

SOFTWARE

ABSOFT
- AC Basic 136.00
- AC Fortran 189.00

ACCESS SOFTWARE
- Leader Board 26.99

AEGIS DEVELOPMENT
- Animator/Images 83.99
- Draw Plus 149.00
- Diga 54.99
- Sonix 49.99

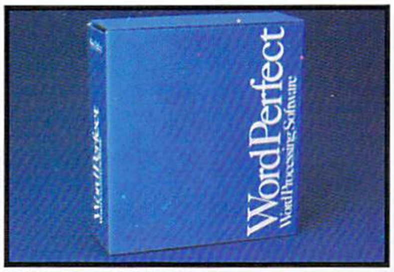
ANAKIN RESEARCH
- Easyl 500 . . . . 299.00
- Easyl 2000 . . . . 369.00

A SQUARED SOFTWARE
- Live! 279.00

COMMODORE
- Enhancer 1.2 Dos 14.99

DISCOVERY
- Marauder II 26.99

ECE RESEARCH
- ECE MIDI 500/1000/2000 . . . . 49.99



WORD PERFECT CORPORATION Wordperfect $199

ELECTRONIC ARTS
- Deluxe Music 62.99
- Deluxe Paint II 97.99
- Deluxe Video 1.2 . . . . 97.99
- Deluxe Production 159.00

EQUAL PLUS
- Financial Plus 189.00

GOLD DISK
- Pagesetter w/Text Ed 89.99

INFINITY SOFTWARE
- Gallieo 49.99
- Shakespeare 169.00

JDK IMAGES
- Pro Video CGI 149.00
- Font Library I or II ea. 64.99

SOFTWARE

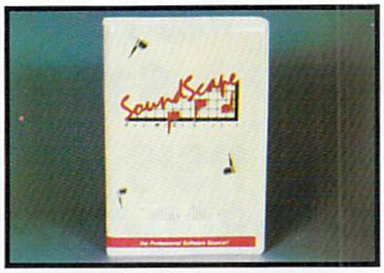
LATTICE
- C Regular 149.00
- C Professional 279.00

MANX SOFTWARE
- Aztec C: Developer 219.00
- Aztec C: Professional 139.00

METACOMCO
- Macro Assembler 66.99
- MCC Pascal 66.99

MICROILLUSIONS
- Dynamic Cad 359.00

MICRO SYSTEMS SOFTWARE
- The Works 139.00
- Analyze 2.0 . . . . 109.00
- Scribble 66.99



MIMETICS PRO Studio $129

MIMETICS
- Midi-Interface A500 . . . . 49.99
- Sound Sampler 99.99
- Amigen Gen Lock 159.00

NEW HORIZONS
- Pro Write 79.99

NEW TEK INC.
- Digi View 2.0 . . . . 139.00
- Digi Paint 44.99

NORTHEAST SOFTWARE
- Publisher Plus 64.99

OXXI SOFTWARE
- Maxiplan 500 . . . . 96.99
- Maxiplan Plus 134.00

SEDONA SOFTWARE
- Money Mentor 59.99

SUBLOGIC
- Flight Simulator II 39.99
- Jet Flight Simulator 37.99

TRUE BASIC
- True Basic Lang 69.99
- Runtime 99.99
- Libraries (ea.) 39.99

VERSASOFT
- DBMan 99.99

VIP SOFTWARE
- VIP Professional 112.00

WORDPERFECT CORP
- Wordperfect 199.00

ZUMA GROUP
- TV Show 64.99
- TV Text 64.99
- Zuma Fonts (ea.) 24.99

CMO COMPUTER MAIL ORDER

Circle 41 on Reader Service card.

In the U.S.A. and in Canada

Call toll-free: 1-800-233-8950

Outside the U.S.A., call 717-327-9575, Fax 717-327-1217

Educational, Governmental and Corporate Organizations call toll-free 1-800-221-4283

CMO, 101 Reighard Ave., Dept. B9, Williamsport, PA 17701

ALL MAJOR CREDIT CARDS ACCEPTED • CREDIT CARDS ARE NOT CHARGED UNTIL WE SHIP.

POLICY: Add 3% (minimum $7.00) shipping and handling. Larger shipments may require additional charges. Personal and company checks require 3 weeks to clear. For faster delivery, use your credit card or send cashier's check or bank money order. Credit cards are not charged until we ship. Pennsylvania residents add 6% sales tax. All prices are U.S.A. prices and are subject to change, and all items are subject to availability. Defective software will be replaced with the same item only. Hardware will be replaced or repaired at our discretion within the terms and limits of the manufacturer's warranty. We cannot guarantee compatibility. All sales are final and returned shipments are subject to a restocking fee.

B907

version of the board—one containing old PAL chips that had a history of incompatibilities with the A2090 (and perhaps Commodore's two-meg card, too). I exchanged it for a replacement card that worked without further difficulty.

In spite of my problems with the original unit, I find the Impact SCSI/RAM board a powerful addition to my Amiga. With the autoboot ROM chips it will be even more useful. If you are shopping for RAM and a hard drive, consider Impact. It will save you money, as well as a slot.

Impact A2000 SCSI/RAM Hard Disk Controller
Great Valley Products
PO Box 391
Malvern, PA 19355
800/426-8957
$320, unpopulated
No special requirements.

LV Backup QuarterBack saf-T-net

Software insurance for your hard work and hard disk.

By Carl Mann

SO YOUR NEW hard disk is up and running. You're zipping through work that once bored you to tears with disk swaps and gronking drives. Isn't it wonderful? Sure is, as long as nothing goes wrong. By the way, how many days of work can you recreate from memory?

A backup utility insures your work. It will back up your hard drive's contents to a set of floppies, and restore the information to the hard disk should disaster strike. The right backup can make the critical difference between a temporary glitch, and being out of business for hours or even weeks.

I tested LV Backup (MKSoft), QuarterBack (Central Coast Software), and saf-T-net (RSN Software). All three perform full or partial backups and restorations (you can dictate that partial operations be performed only on files that have changed since the last backup). Each starts from the Intuition interface, and none are copy protected. Also, all of them back up and restore from a variety of AmigaDOS devices in addition to hard disks. Each will prompt you for the right disk if you try to feed it the wrong one during a restore cycle, and all refuse disks produced by either of the others. The commonality ends there though. The accompanying chart will give you an idea of the differences.

LV Backup: Simple Does It

LV Backup offers by far the simplest user interface of the bunch. The restore option is pretty pokey, but if you need to use it more than once or twice in a year, there's something wrong. At any rate, the error messages are easy to understand and the huge busy indicator is impossible to miss. The tiny manual is clear, brief, and easy to use, but it does lack an index.

LV Backup will back up from any Amiga device except df0:, which it reserves as its "work drive." This, combined with the fact that no other Amiga work can be done while the program is running, may seem odd. In defense of this system though, backups are usually the last thing I do at the end of the day, when I don't feel super productive anyway.

LV Backup offers a substantial bonus: a full-featured text editor. You'll gladly discard the Amiga ED for MKSoft's TextEd. In addition, there's a spiffy printer spooler complete with C source code, an excellent version of the classic Go-Mo-Ku game, and an elegant title-bar clock. All in all, a lot of software for a small price.

As we go to press, version 5 of LV Backup, the Workbench 1.3-compatible update, has arrived. Version 5 offers no speedier backups and restores to RAM:, but because it takes advantage of the 1.3 Fast File System (the only apparent change), a 30-minute backup-to-floppy cycle under 1.2 is reduced to about seven minutes. As a result, the fact that LV Backup ties up df0: is a lesser consideration. My hat is off to MKSoft; I'm sure the other development houses will offer similar upgrades in the future.

QuarterBack: Very Friendly

QuarterBack appears to set new standards in user friendliness. The program will use all available floppy drives as ►

backup devices, automatically switching from one to the next. But this friendliness can seem downright chatty at times. Four preliminary windows stand between you and actually backing anything up. On the other hand, you can speed through the menus by saving your configuration options. Besides, you can, as with LV Backup, select individual directories and all or part of their contents for the session. And once you grow into QuarterBack, you can forget the menus and invoke it directly from the CLI with a customized command file. QuarterBack also records its activities on disk for reference. Unfortunately, though, the log is limited in usefulness because it lists only the files transferred, and bypasses any error messages.

QuarterBack crashed twice under load. In both cases though, my test conditions were severe. I was doing a second restore pass from a floppy in df1:, and running eight background tasks (as I usually do) when the Guru appeared.

The manual is written in conversational English, without an index.

Spotlight on Features

FEATURE:	LV BACKUP	QUARTERBACK	SAF-T-NET
Backup from device	Any but df0:	Any	Any
Backup to device	df0: only	df0:-df2: select one or more	df0:-df3: select one only
Restore from device	df0: only	df0: only	df0:-df3: select one only
Restore to device	Any but df0:	Any	Any
Support wildcards?	No	Yes	Yes
Include/exclude masks?	No	Yes	Yes
Invokable from CLI?	Yes; no user arguments	Yes; extensive command files	Yes; no command files or arguments
Multitasking?	No	Yes	Yes
User configurable?	No	Yes	Yes
Save user options?	No	Yes	No
Activity log file?	No	Yes; files only	Yes; files and errors

saf-T-net: Power Without The Price

The lowest priced of the three, saf-T-net is a bang-for-the-buck winner. Its user interface is distinctive. Unlike the other two, which open onto the Workbench screen, saf-T-net sets up a screen for its exclusive use. This approach makes multitasked-system configurations easy to produce.

The 29-page manual is comprehensive and slightly terse (UNIX hackers will recognize its style). The error-reporting messages are indexed for diagnostic use.

Unlike QuarterBack, saf-T-net presents all its configuration options on a single display. This makes it easy to correct a ►

CHECK US OUT! WE MAKE IT EASY

☑ SERVICE ☑ SUPPORT ☑ SELECTION ☑ PRICES ☑ GUARANTEE

UTILITIES

AC BASIC	135
AC FORTRAN	199
Assempro	64
Atalk Plus	52
Aztec Debugger	49
Aztec Developer	195
Aztec Professional	129
Benchmark Modula 2	129
Butcher 2.0	25
C64 Emulator	46
CLI Mate	27
DOS-2 DOS	35
Diga	52
Disk-2-Disk	32
Diskmaster	39
FACC II	25
Flipside	39
GOMF	25
Lattice C Professional	245
Lattice C Regular	129
Maurader 2	25
Online	45
Power Windows 2 EA	59
True BASIC	69

PRODUCTIVITY

Business

Amigamotion	65
Deluxe Write	69
KFS Accountant	195
Microlawyer	39
Money Mentor	69
Nimbus Accounting	95
P.H.A.S.A.R.	61
The Works	129

Databases

Acquisition	189
DataRetrieve	52
Logistix	95
Microfiche Filer	69
Organize	52
Superbase Personal	95
Superbase Professional	199

Spreadsheets

Analyze 2.0	94
Haicalc	39
Maxi Plan	95
Maxiplan Plus	129

Wordprocessing

Becker Text	89
Dynamic Word	129
Excellence	159
Fleet Check	27
Flow	65

PRODUCTIVITY

Gold Spell	29
LPD Writer	75
Laser Script	29
Lex Check	25
Precisely	55
ProWrite	75
Reason	249
Scribble	55
Softwood Write/File	69
Textpro	52
Wordperfect	225

ENTERTAINMENT

AAArg	25
Airball	27
Alien Fire	27
Arazok	29
Archon 2	17
Arkanoid	35
Artic Fox	29
Auto Duel	35
Awesome	33
BMX Challenge	19
Balance of Power	29
Barbarian	27
Bard's Tale	33
Beyond Zork	34
Black Cauldron	29
Black Jack Academy	27
Block Busters	33
Breach	27
Bridge 5.0	25
California Games	29
Capone ** NEW **	27
Crown Jewels	27
Dark Castle	29
Defender of the Crown	33
Deja Vu	33
Descartes	25
Destroyer	29
Dungeon Master ** NEW **	28
Ebonstar ** NEW **	27
Ferrari Formula One	33
Fire Power	19
Flight Simulator 2	35
Footman	22
GB Air Rally	27
GO	28
Galatic Invasion	19
Gold Runner	27
Golden Path	29
Grand Slam Tennis	32
Gridiron Football	42
Guild of Thieves	29
Hardball	29
Harrier Combat	33
High Roller	35

ENTERTAINMENT

Hunt for Red October	33
Ice Hockey ** NEW **	call
Indoor Sports	33
Insanity	27
Into the Eagles Nest	29
Jet ** NEW **	35
Jewels of Darkness	22
Kampgruffe	39
Karate Kid 2	27
King of Chicago	33
King's Quest 1, 2 OR 3 EA	33
Knight Orc	29
Land of Legends	32
Leaderboard	26
Marble Madness	33
Mean 18	29
Moebius	39
Pawn	29
Phantasie 3	27
Phasar GUN ** NEW **	40
Plutos	22
Port of Call	32
Power Pak GAMES	25
Racter	30
Return to Atlantis	33
Road Europa	29
Roadwar 200	27
Rocket Ranger	33
Rogue	27
Romantic Encounter	27
S.D.I.	33
Shadow Gate	33
Shanghai	27
Silent Service	33
Silicon Dreams	23
Sinbad	33
Smooth Talker	33
Space Quest	33
Star Fleet 1	39
Star Glider	29
Stellar Conflict	27
Strip Poker	29
Surgeon	34
Tass Times in Tonetown	27
Tele Games	24
Tele Wars	27
Terrorpods	27
Test Drive	29
Thexder ** NEW **	25
Three Stooges ** NEW **	32
Timebandits	27
Turbo	19
Ultima 3	29
Ultima 4	39
Uninvited	32
Video Vegas	25
Vyper	22
Wrath of Nicodian	27

EDUCATION

Demonstrator	22
Discovery Expansion Disks	15
Discovery Titles ALL-CALL	27
Fairy Tale Adventures	32
First Letters	33
First Shapes	33
Great States 2	29
KidTalker	33
Linkword Foreign Lang EA	24
Little Computer People	25
Mastertype Improved	29
Math Talk	33
Mathtalk fractions	33
Perfect SAT Score	55
Planetarium	45
Senor Tutor	52
Speller Bee	33

CREATIVITY

Publishing

Page Setter	90
Professional Pages	249
Publisher Plus	64
Publishing Partner	129
Shakespeare	149

Graphics

Analytic Art	40
Animate 3D	99
Animator Effects	33
Animator Flipper	27
Animator's Apprentice	195
Animator/Images	85
Award Maker Plus	call
Bumper Sticker Maker	37
Business Card Maker	37
Calligrapher	82
Calligrapher 4-Pak	59
Centerfolds	call
City Desk	99
Color Separator	129
Comic Setter	65
Deluxe Paint 2.0	92
Deluxe Photo Lab	70
Deluxe Print	70
Deluxe Video	92
Digi Paint	40
Digi View 2	129
Director	49
Draw Plus	165
Dynamic CAD	249
Express Paint 2	52
Graphics Studio	39
Home Builder's CAD	129
Impact	59
Intro CAD	52
Lights	52

CREATIVITY

Page Flipper	35
Photon Paint	65
Photon Video Cell	105
Photon Video Translator	195
Pix Mate	45
Print Master Plus	33
Print Mst Fonts/Borders	22
Project D	35
Silver	115
TV Show	64
TV Text	64
Video Titler	95
Video Toaster	call
Videoscape 3D	125

Sound/Music

Audio Master	39
Deluxe Music	70
Dynamic Drums	52
Dynamic Studio	129
Hotlicks	34
Instant Music	34
Music Mouse	55
Music Studio	34
Music X	195
Sonix	52
Studio Magic	65
Synthia	65

BRIWALL

Solid Products • Solid Support

P.O. Box 129, 56 Noble St.
Kutztown, PA 19530

TOLL-FREE 24 HOURS
1-800-638-5757

OUR PROMISE

WE GUARANTEE YOUR SATISFACTION

If, for any reason, you are not satisfied with your selection within 15 days of your receipt, simply return the product to us. We will either issue you full credit for exchange on another selection, or refund your purchase price, less $5.00 for restocking and handling. Defective items are replaced free of charge!

Free Spirit Software Inc.

ULTRA DOS UTILITIES

MODULE I

Ultra DOS Utilities - Module I is the ultimate file handling and backup system for the Amiga series of computers. Ultra DOS brings the simplicity and ease of use of the intuition operating system to AmigaDOS. Use UltraDOS to:

- Perform virtually all AmigaDOS functions at the click of a mouse button
- Copy/delete files from/to any legal AmigaDOS device
- Copy by simple or complex wild card patterns
- Copy by creation date, volume device or directory
- Quickly and easily install even the most complex software on your hard drive
- Backup valuable files on a floppy or hard drive
- Perform whole hard drive backup with multi-format feature
- Preview & edit text files
- Preview IFF picture files
- Set & clear all types of file protection

Ultra DOS Utilities - Module I supports "batch" selection of files for copy/deletion and allows file selection across directory or volume boundaries greatly easing software installation on hard drives. Ultra DOS uses double buffering for lightning fast copies. Since Ultra DOS does not monopolize the CPU to achieve its speed, multi-tasking is fully supported. Ultra DOS auto-configures to multi-hard drive systems or multi-partitions. Ultra DOS will support more than 10 meg of memory. Ultra DOS is compatible with all Amiga versions (512K Amiga required).

Ultra DOS Utilities - Module I makes all other intuition based DOS utilities obsolete. **only $39**

Your Key to Learning The AMIGA™



The 'Kickstart'™ Guide to the AMIGA™ $24.95

A most comprehensive guide to operating the AMIGA™. A best seller in Europe finally offered in the US!

ADRIADNE SOFTWARE LTD with Midnite Press
Distributed by Micro Pace, Inc. 1212 Hagan, Champaign, IL 61820
Dealer inquiries welcome (217) 356-1885

DO WE HAVE HARDWARE?

! YES !

Call or write for our complete price list of hardware & accessories!

$$$$$$$$

COLLECT BONUS DOLLARS

One bonus dollar, good towards your next purchase, for every $50.00 ordered!

CALL FOR LATEST PRODUCTS, PRICES AND COMBINATION SPECIALS!

ORDERING INSTRUCTIONS: VISA, MasterCard, Personal Check, Money Order, COD or School P.O.'s are welcome. Shipping USA $4.00/ground, $6.00/2nd Day, $14.00/overnight. C.O.D. add $3.00. Canada/Mexico: $6.00 Air Mail Foreign: $12.00 (for Air Mail use charge & specify maximum). PA residents add 6% sales tax. Include phone number and computer drive model with order. All items will be shipped immediately, (if we are out-of-stock we will let you know). **SHIPPING CHARGE IS PER ORDER!**

For CUSTOMER SERVICE please call us:
Monday thru Friday, 9:30 a.m. - 4 p.m. EST
1 - (215) - 683-5699

VISA MasterCard NO SURCHARGE

configuration error and retry without a lengthy menu cycle. saf-T-net's activity log is highly detailed. All error messages are included, and are listed in order of occurrence.

On the downside, saf-T-net users cannot do partial restores and backups by clicking on a directory name in the display window. Instead, all files are displayed in a single window with their full pathnames, and you must select each individually. This, however, means that no selected files are ever hidden from view.

saf-T-net disks must be copied with the special utility provided. Attempting to use the AmigaDOS DiskCopy command or Intuition will fail.

Marking Time: The Speed Contests

Using the Amiga RAM: device on my one-megabyte system to produce universally meaningful results, I timed each product as it performed backup and restore operations between RAM: and the floppy drive. I conducted three separate runs, and then averaged the numbers for each. My test disk contained 140 files, totaling approximately 680K of information.

The two leaders showed no substantial difference between backups to unformatted or preformatted disks. The first program to cross the backup finish line was QuarterBack, with an average time of 51 seconds. LV Backup came in only four seconds behind at 55 seconds. saf-T-net trailed with a time of two minutes, 40 seconds for unformatted disks, and a minute, 45 seconds for preformatted target disks.

QuarterBack, that all-around speedster, won the restore contest too, with a time of one minute, 20 seconds. saf-T-net took the red ribbon with one minute, 50 seconds, and LV Backup clocked in at an even three minutes.

Each of the three programs will appeal to a different user. LV Backup's simplicity will appeal to anyone who wants to get the job done without fussing around. QuarterBack will be the choice of those with slight hackerish tendencies. Although the program broke under heavy use, its configuration and command files and multi-floppy access abilities save time. saf-T-net is a system developer's delight; it speaks computerese, but its powerful options require extra caution.

All three of these programs do the job they set out to, and none has serious bugs. Your choice will depend on how much of a hacker you consider yourself to be, and how much flexibility you need from a backup utility.

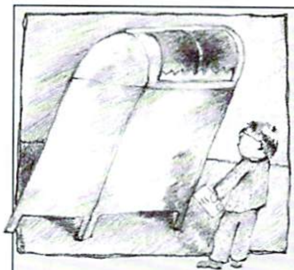
LV Backup
MKSoft Development
2818 Red Fox Trail
Troy, MI 48098
$69.95
512K required.

QuarterBack
Central Coast Software
268 Bowie Drive
Los Osos, CA 93402
805/528-4906
$69.95
512K required.

saf-T-net
RSN Software Inc.
4122 S. Parker Rd.
Aurora, CO 80014
303/690-0102
$49.95
512K required. ►

Circle 181 on Reader Service card.

Circle 149 on Reader Service card.



MAIL ORDER MADE EASY!

AmigaWorld knows the meaning of the term "valued customer", therefore we have put together a few guidelines for our customers to use when ordering from mail order companies advertising in our magazine. These are only guidelines, so if you wish to find out specific laws in your state, we suggest you call your State Attorney General's office.

AmigaWorld does not intentionally run advertising that is not legitimate. However, occasionally there is the "bad apple" and we have to deal with the problems created by such a company. We will be the first to tell you if a company cannot meet its obligations or stand by its word. Should you have a problem with one of our advertisers, write to:

Lisa LaFleur, Customer Service
AmigaWorld Magazine, 80 Elm St., Peterborough, NH 03458

Include in your letter a description of the problem, your name, address, telephone number, copies of any cancelled checks, credit card statements, and the dollar amount involved. We will act on your behalf in contacting the company to help you get your particular problem resolved. We do not make any guarantees in the results, but we will try.

Should you wish to inquire as to the reputation of a company we can provide objective and up-to-date information. Please call Lisa LaFleur at 1-800-441-4403.

The following is a listing of basic guidelines to use when ordering mail order either through the mail or over the telephone.

1. Know the advertiser:

If you haven't seen this company advertising in the past, call the magazine and inquire.

a. Occasionally advertisements will look similar, almost as if one were a direct copy of the other.

b. Be sure you identify the company from which you prefer to buy.

2. When ordering by mail:

a. Fill out the order form completely and double check for errors.

b. Keep a copy of the order and the advertisement. Make sure you have a telephone number for both the magazine and the advertiser. Note the date you mail the order.

c. If using a credit card, check with your credit card company on their policy for disputing charges.

d. If an item is backordered, the company must notify you by mail within the advertised shipping time period or 30 days. If the item is not shipped 30 days after the first notification, they must notify you again, and every 30 days after that, giving you the opportunity to cancel your order.

3. When ordering by telephone:

a. Fill out the order form completely, double check for errors and keep it next to the telephone when calling in your order.

b. Write down the date you call, the name of the person taking the order and ask if it is an order taking service or if the person works directly for the company.

4. What to look for on the ad and what to ask for on the phone:

a. Check the prices of the items you are ordering. Ask if the item is on sale. Ask about quantity discounts, if you are ordering more than 1 or 2 items.

b. Ask about shipping charges. How are the items shipped? Do you have a choice? Who pays for shipping? How long will it take?

c. If items are damaged in shipping or incorrect, ask who pays for return shipping.

d. If an item is incorrect or damaged, ask if you need an authorization number or form to return the item.

e. Ask if there is a restocking fee when an incorrect or damaged item is received.

f. Ask if the item is in stock and the quantity available.

Take your time and do some research on several companies before ordering. Mail order can be easy, safe and save you quite a bit of money when you do it right.

AMIGA WORLD

RETURN TO ATLANTIS

AS AN EXPERT marine biologist of the Foundation, your goal is to preserve the oceanic ecosystem. You must work through 14 linked adventures, becoming further attuned to your subaquatic environment, and eventually fitting together the pieces of an elaborate plot.

You receive half your mission statement from a top Foundation agent; the more important part you read in the manual. From your base on Isle Perdida, you proceed to the Sea Thief Cafe where you meet five characters. You can bribe, threaten, or plead with them, and at least one will reveal useful information.

Aboard your ship the Viceroy, you get further instructions through ART, the Advanced Robotic Transcoordinator that receives messages and scans the ocean floor. You'll also find a Medical Beam, capable of restoring your failing health, and a Gear Room filled with equipment.

Once you dive, the real work begins. On screen, you see yourself, donning scuba gear and ready to swim, surrounded by sea creatures and plantlife. The mouse seems to be the easiest way to control your direction, but you can opt for a joystick or the keyboard. At the bottom of the screen is a menu bar, from which you can select maneuvers. You can swim, scan, attack, use equipment, and order ART to beam things up to, or down from, the Viceroy. You can also command RUF (Remote Underwater Friend), your search robot.

Unfortunately, the game stops just short of excellence. The mechanisms provided for steering your diver are awkward, and generate sluggish response. This may reflect the difficulty of moving underwater, but often the diver doesn't react at all. Using your weapon is difficult too, and commanding ART is sometimes much work for little payoff. More importantly, the requirement that you complete each mission in order can be frustrating. While some assignments are easy to solve, others are difficult—mainly because of weak or ambiguous instructions. Episodes four, seven, and ten took me several attempts (I eventually called Electronic Arts' hint line); I would rather admit I'd failed and move on.

What the game lacks in these areas, it makes up for in concept. The missions take you through an intriguing mystery. Unlike most computer games, this one demands ethical behavior. Your missions are for the sake of ecology, and if you fail to preserve life you are reprimanded and must replay the episode. At times it's a bit heavy-handed, but overall a refreshing difference.

Mechanically, Return to Atlantis suffers a little, but graphically it is very good, and conceptually it's superb. Mildly addictive, it also offers novelty for those interested in the progress of computer games. *(Return to Atlantis, Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404, 415/571-7171. 512K required.)*

—Neil Randall

11 *steps to great music*

Designing, delivering, and supporting advanced music software are the realities we have lived with daily for over four years. The products you see here take full advantage of the Amiga's high quality graphics, true multitasking, and superb sound.

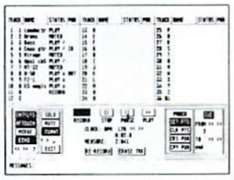
We offer you the tools to sculpt your personal musical statement; from an extremely powerful and affordable entry level sequencer, the MIDI Recording Studio, to the most advanced music composition system on any computer, Level II. Caged Artist editors are simply the most powerful and efficient synthesizer sound editors available. Each fully graphic environment is uniquely tailored to make creating sounds as fun and easy as possible. The Model-A MIDI interface is a one-in, multiple-out device with serial port pass-thru at an affordable price and supports all standard Amiga MIDI software.

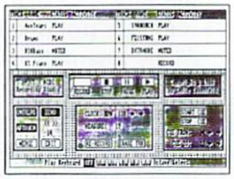
All of the programs you see here are available now. Try us and see why we are the most respected name in MIDI music software. Dr.T's products are available wherever fine software is sold.

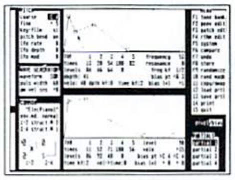
Call or write for our free brochure and four-color brochure.

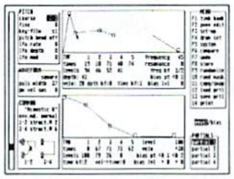
1

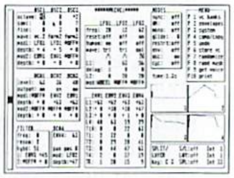
Level II

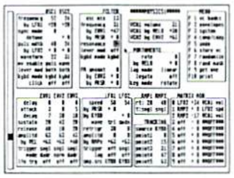
2

KCS V1.6

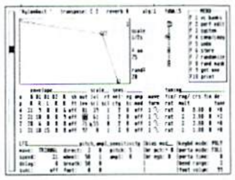
3

MIDI Recording Studio

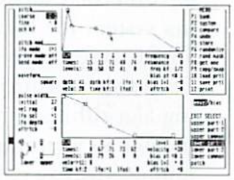
4

Roland D-10/110

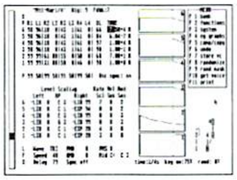
5

Roland MT-32

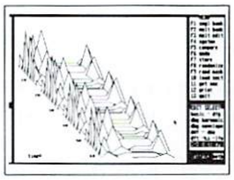
6

ESQ-1/SQ-80

7

Matrix 6/1000

8

TX-81Z (4-OP)

9

Roland D-50

10

DX-Heaven

11

Kawai K-5

Dr.T's MUSIC SOFTWARE 220 Boylston Street, Suite 206, Chestnut Hill, MA 02167 (617) 244-6954

Circle 35 on Reader Service card.

WHAT'S NEW?

Where else can you find products to shoot gangsters, give the weather report, fingerpaint, and have your Amiga turn on the coffee pot?

Compiled by Barbara Gefvert

PRINT OPTIONS

GET A CHARGE out of printing with **TURBOprint**. Because it's programmed in 68000 assembly language, TURBOprint promises fast rendition. It supports all screen resolutions, and you can choose from four color conversions. The drivers allow for any print density on dot-matrix, thermo, ink-jet, and laser printers. Contact Intelligent Memory, Borgsigallee 18, 6000 Frankfurt am Main, West Germany 069-410071/72.

With the new 1.3 drivers, you can use a **Tektronix 4693D Color Image Printer** with your 2000. The printer uses a four-pass thermal wax color printing system for high saturation and a large range of color. Tektronix's proprietary dithering algorithms enable the printer to reproduce over 16 million display colors. In its two monochrome modes, the machine prints black and white only, or up to 256 shades of gray. The frame buffer, expandable to 12 megabytes of memory, will store three images, and the Motorola 68020 microprocessor accepts large amounts of image data. Using an industry-standard Centronics parallel interface, you can connect up to four workstations simultaneously. Get printing for $8495. Contact Tektronix Inc., PO Box 15273, Portland, OR 97215, 503/235-7202, 800/225-5434.



The Tektronix 4693D printer, with output examples.

MAN YOUR STATIONS

A MODULE-based video graphics series, **Station Manager** brings you high-end hardware and software at a fraction of the usual cost. The modules include the Deluxe-Productions "graphics animation engine" ($195), a Station Manager Character Generator with over 300 fonts ($195), the Weather Graphics Weather-Link for downloading maps and data from popular weather services ($195), a Weather Graphics Map Generator that can produce a high-res map for any spot on the globe ($145), the Station Manager Graphics Library containing 300-plus graphics such as maps, backgrounds, and symbols ($195), Station Manager's Teleprompter, a module that imports text from any word processor ($295), a Tape Library Management System ($295), an On-Air Time & Scheduling module ($295), a Station Manager Tape Editor ($495), and wireless remote control ($195). Get the full system for $1895 without tape editor, and $2295 with. Contact Associated Computer Services, 1306 E. Sunshine, Springfield, MO 65804, 417/887-7373.

AIM AND FIRE

WITH **CAPONE**, Actionware gives new meaning to the term "shoot 'em up." While you *can* use your mouse to play the game, the program supports Actionware's **Light Phasar Gun** ($49.95) as well, so you can literally aim and fire at gangsters in the streets of 1920 Chicago (don't hit the innocent bystanders though). Capone's maker will release two other phasar-compatible games shortly too—**POW** (bring our boys home) and **Creature** (protect your spaceship). The games are $39.95; shoot your questions off to Actionware, 38 W. 255 Deerpath Rd., Batavia, IL 60510, 312/879-8998, 800/848-2333.

BESPECTACLED

WHAT HAPPENS WHEN high-speed liquid crystal shutters allow your computer to control what each of your eyes sees individually (at 30 frames per second)? You peer into another dimension—the third dimension—of video graphics. Unlike ordinary red-and-green 3-D glasses, the **X-Specs 3D** package ($124.95) includes hi-tech shades, software, and a mouse-port interface. Look for supporting programs, and get all the 3-Details from Haitex Resources, 208 Carrollton Park, Suite 1207, Carrollton, TX 75006, 214/241-8030. ►

Creative Computers

Orders only: **800-872-8882** (outside CA) **213-370-2009** (inside CA)
Mon.-Sat. 8 A.M. to 6 P.M. Pacific Time

New from Electronic Arts!



Special price: $37.95
The first flight simulator designed for the Amiga!!
FREE pair of EA ray-deflector glasses w/ purchase!!
(while quantities last)

SEE US AT
AmiEXPO
The Amiga Event!
July 22-24, 1988
Chicago Hyatt Regency
Booth #II
Creative Computers is the **exclusive** retailer of AmiExpo-Midwest.

SOFTWARE

3-DEMON	***71.95***
A-TALK PLUS	51.98
AAARGH!	***23.95***
AC FORTRAN	199.00
ACQUISITION 1.3	206.22
ADRUM	***51.98***
ADVANCED STRINGS	36.13
ADVENTURE CONSTRCTION SET	14.40
ADVENTURES OF SINBAD	32.46
AEGIS ANIMATOR	87.48
AEGIS ART PAK#1-CLIP ART	24.98
AEGIS IMAGES-PAINT	24.98
AESOP'S FABLES	31.23
AIRT SYMBOLIC LANGUAGE	44.95
ALGEBRA II	36.13
ALIEN FIRES	24.98
ALL ABOUT AMERICA	37.47
ALOHA FONTS	12.96
ALTERNATE REALITY-THE CITY	27.06
AMEGAS	22.72
AMIGA DOS EXPRESS	20.60
AMIGA KARATE	24.98
ANALYTIC ART-GRAPHICS	37.48
ANALYZE 2.0-SPREADSHEET	93.73
ANIMAL KINGDOM	31.23
ANIMATE-3D	***99.95***
ANIMATION EFFECTS	32.46
ANIMATION STAND	32.46
ANIMATOR FLIPPER	24.98
ANIMATOR JR.	49.38
ANIMATOR'S APPRENTICE	184.38
ARAZOK'S TOMB	31.25
ARCADE ACTION PACK	***34.95***
ARCHON	14.95
ARCHON II: ADEPT	14.95
ARCTIC FOX 1.2	26.40
ARENA	12.96
AREXX	32.95
ARKANOID	35.72
ART COMPANION	19.95
ART GALLERY FANTASY	23.36
ART GALLERY I, II	18.73
ART PARTS #2	21.60
ASHA'S FONTS	58.95
ASSEMPRO	59.97
ATTITUDE ENGINEER	25.98
AUDIO MASTER	37.48
AZTEC C PROFESSIONAL	175.46
B.E.S.T. BUSINESS MGMT.	355.50
BALANCE OF POWER	34.34
BALLYHOO	27.47
BARBARIAN	25.77
BARD'S TALE	36.00
BASIC GRAMMER SERIES	19.46
BBS-PC	62.32
BECKER TEXT	99.95
BENCHMARK C LIBRARY	64.97
BENCHMARK IFF LIBRARY	64.97
BENCHMARK MODULA-2	129.97
BENCHMARK SIMPLE LIBRARY	64.97
BEYOND ZORK	33.76
BIG PICTURE OKIMATE	18.95
BLACK CAULDRON	28.80
BLACK JACK ACADEMY	29.95
BLITZKRIEG AT ARDENNES	34.41
BLOCKBUSTER	32.47
BORROWED TIME-TEXT ADVNTR	30.90
BREACH	25.95
BREACH SCENARIO DISK	16.21
BRIDGE 4.0-CARD GAME	20.55
BRIDGE 5.0	24.10
BRUSH WORKS	20.59
BRUSH WORKS 2	19.95
BUMPER STICKER MAKER	37.45
BUREAUCRACY	27.47
BUTCHER 2.0	23.13
BUTTON AND BADGE MAKER	38.98
C-ZAR	126.75
C.A.P.E. 68K ASSEMBLER	58.47
CALLIGRAPHER	79.40
CAMBRIDGE LISP	124.95
CAPITALIZATION SERIES	19.46
CAPONE	***25.96***
CASINO FEVER	25.96
CB TREE PLUS	64.95
CENTERFOLD SQUARES	19.95
CHAMPIONSHIP BASEBALL	27.46
CHAMPIONSHIP BASKETBALL	29.95
CHAMPIONSHIP FOOTBALL	30.90
CHAMPIONSHIP GOLF	27.46
CHESSMASTER 2000	32.40
CHICKEN LITTLE	19.48
CITY DEFENSE	14.95
CITY DESK	93.75
CITY DESK ART COMPANION	19.47
CLI MATE	24.98
CLIP ART SERIES	12.95
COMICS ON DISK	12.96
CRAZY CARS	***25.94***
CRIMSON CROWN	12.97
CROSSWORD CREATOR	34.34
CRYSTAL HAMMER	12.96
CUBEMASTER	22.71
CUSTOM SCREENS	43.73
DARK CASTLE	25.95
DATA RETRIEVE	49.95
DBMAN/DBASE III CMPTBLE	129.97
DEATH SWORD	***16.95***
DECIMAL DUNGEON	31.23
DEEP SPACE	17.95
DEFCON 5	25.95
DEFENDER OF THE CROWN	34.34
DEJA VU	34.34
DELUXE HELP CALLIGRAPHER	22.71
DELUXE HELP FOR DIGIPAINT	21.84
DELUXE HELP FOR DPAINT II	21.84
DELUXE MAPS	16.22
DELUXE MUSIC 2.0	69.95
DELUXE PAINT II	89.95
DELUXE PRINT + ART DISK	72.00
DELUXE PRINT ART DISK #2	21.60
DELUXE PRODUCTIONS	***139.95***
DELUXE VIDEO 1.2	89.95
DES CARTES	22.71
DESKTOP ARTIST	18.73
DESTROYER	25.26
DETONATOR	25.97
DEVELOPERS TOOLKIT	36.22
DIABLO	23.36
DIGA-TELECOM PACKAGE	49.98
DIGI PIX #2	22.71
DIGI-DROID	69.95
DIGI-PAINT	41.22
DIGI-VIEW	143.72
DISCOVERY EXPANSION DISKS	12.97
DISCOVERY GAME DISK	25.00
DISCRETE MATHEMATICS	36.22
DISK MECHANIC	58.50
DISK TO DISK	34.34
DISKMASTER	37.40
DOCTOR TERM PROFESSIONAL	74.06
DOMINOES	16.95
DONALD DUCK'S PLAYGROUND	18.00
DOS TO DOS	37.82
DOUG'S MATH AQUARIUM	58.46
DPAINT ART&UTIL. DISK #1	21.60
DR. FRUIT	19.46
DR. T'S SYNTH EDITORS	CALL
DR. T'S KCS 1.6	161.98
DR. XES	34.34
DRAW PLUS (AEGIS)	162.48
DRUM STUDIO	32.47
DYNAMIC DRUMS	49.98
DYNAMIC STUDIO	142.96
DYNAMIC WORD	124.38
DYNAMIC-CAD	340.32
EARL WEAVER BASEBALL	34.95
EASY LOANS	25.00
EBONSTAR	25.96
EMERALD MINES	13.97
EMPIRE	34.32
ENCHANTER	20.59
ENHANCER 1.2	10.62
EXCELLENCE!	***162.50***
EXPRESS PAINT (NEW VERSION)	62.50
FACC II	21.85
FAERY TALE ADVENTURE	31.23
FAST FONTS	24.98
FERRARI FORMULA ONE	33.57
FEUD	12.96
FINAL TRIP	19.46
FINANCIAL COOKBOOK	14.40
FINANCIAL TIME MACHINE	31.16
FIREPOWER	15.60
FIRST LETTERS & WORDS	33.00
FIRST SHAPES	33.00
FLEET CHECK	25.96
FROST BYTE	19.46
FLIGHT SIMULATOR II	37.46
FLIP FLOP	9.75
FLIPSIDE	37.48
FLOW	62.32
FONTS AND BORDERS	22.72
FOOTBALL FACTS	42.97
FOOTMAN	21.95
FORMS IN FLIGHT	44.95
FORTRESS UNDERGROUND	13.23
FOUR IN ONE	18.68
FRACTION ACTION	31.23
GALACTIC INVASION	13.79
GALAXY FIGHT	16.23
GALILEO 2.0	49.95
GAMES GALLERY	18.75
GARRISON	29.19
GARRISON II	35.71
GEE BEE AIR RALLY	29.95
GENERAL LEDGER	62.95
GEOMETRIC LIBRARY	11.88
GETTYSBURG	38.95
GIZMOZ 2.0	39.95
GNOME RANGER	13.23
GOLD DISK FONT SET #1	21.85
GOLD SPELL	28.10
GOLDEN PATH	29.21
GOLDEN PYRAMID (GAMESHOW)	24.03
GOLDRUNNER	24.98
GOMF 2.0	***22.72***
GRABBIT	20.59
GRAND SLAM TENNIS	31.25
GREAT STATES	24.99
GREAT STATES II	25.96
GRID START	16.22
GRIDIRON-FOOTBALL GAME	9.95
GUILD OF THIEVES	30.90
HACKER II	27.46
HAICALC	30.80
HALLEY PROJECT	30.90
HARDBALL	28.12
HARRIER COMBAT SIMULATOR	32.95
HEAD COACH	32.47
HEX	24.95
HITCHIKERS GUIDE	20.59
HOLLYWOOD HIJINX	27.47
HOLLYWOOD POKER	25.96
HOME BUILDERS CAD	129.96
HOT & COOL JAZZ	21.60
HOT LICKS	27.59
HUGE PRINT	29.21
HUNT FOR RED OCTOBER	23.34
IMPACT-BUSINESS GRAPHICS	62.46
INDOOR SPORTS	31.22
INOVATOOLS I	51.96
INSANITY FIGHT	25.96
INSTANT MUSIC 1.2	33.00
INTELLITYPE	***35.17***
INTERCEPTOR	***37.95***
INTERACTION	22.71
INTERCHANGE	29.22
INTERCHANGE CONVERSION	16.95
INTERCHANGE OBJECTS #1	16.95
INTO THE EAGLE'S NEST	28.56
INTROCAD	49.95
INVENTORY MGMT	62.95
INVESTOR'S ADVANTAGE	64.97
IT'S ONLY ROCK & ROLL	21.60
J FORTH	68.74
JET	37.46
JET SET FONT SET	32.50
JEWELS OF DARKNESS	19.95
JINXTER	25.95
KAMPFGRUPPE	41.22
KARA FONTS	***54.95***
KARATE KID II	25.97
KARATE KING	15.56
KARTING GRAND PRIX	16.22
KEY GENIE	34.34
KEY TO C	22.72
KEYBOARD CADET	27.47
KICKWORK	19.46
KIDTALK	31.95
KINDERAMA	31.23
KINDWORDS	62.50
KING OF CHICAGO	34.34
KING'S QUEST I, II, III	32.95
KNIGHT ORC	30.90

We carry over 800 products. Call for unlisted items.

KWIK SPEAK	28.04
LAND OF LEGENDS	CALL
LARRIE	12.96
LATTICE C 4.0	162.47
LATTICE C PROFFESIONAL	212.47
LAZERSCRIPT	28.10
LEADER BOARD TORNA DISK	14.00
LEADER BOARD-GOLF GAME	27.00
LEARNING THE ALPHABET	19.46
LEATHER GODESSES	27.47
LEATHERNECK	25.96
LEISURE SUIT LARRY	26.40
LEXCHECK	26.85
LIBYANS IN SPACE	19.97
LINKWORD SERIES (EACH)	20.55
LINT (GIMPLE)	63.70
LION'S AMIGA ART STUDIO(FONTS)	38.97
LISP 1.3-BY METACOMCO	137.47
LITTLE RED HEN	19.48
LOGIC WORKS	62.47
LOTTERY MAGIC	19.21
LPD FILER-DBASE	81.23
LPD PLANNER-SPREADSHEET	81.23
LPD WRITER-WP	81.23
LURKING HORROR	25.96
MAD LIBS	12.48
MAGICAL MYTHS	32.47
MAGICIAN'S DUNGEON	21.84
MARAUDER II-DUPLICATION	27.47
MARBLE MADNESS	33.00
MASTER TYPE	27.47
MATCH IT	25.71
MATH MAGICIAN	27.49
MATH TALK	31.25
MATH TALK FRACTIONS	24.95
MATH WIZARD	31.23
MATH-AMATION	64.95
MAVIS BEACON TYPING	*30.89*
MAXIPLAN 500	93.13
MAXIPLAN PLUS	124.40
MEAN 18 COURSE DISK	14.96
MEAN 18 GOLF	28.77
METACOMCO ASSEMBLER	68.72
METACOMCO PASCAL	68.72
METACOMCO SHELL	48.10
METACOMCO TOOLKIT	34.34
METASCOPE DEBUGGER	59.95
MICROFICHE FILER	69.95
MICROLAWYER	37.47
MIND WALKER	34.34
MIND LIGHT 7	153.95
MISSION ELEVATOR	34.95
MOEBIUS	39.95
MONEY MENTOR C VERSION	59.98
MOONMIST	27.47
MOUSETRAP	12.96
MULTI-FORTH	59.95
MULTI-PREFS	19.45
MUSIC MOUSE	51.35
MUSIC X	CALL
NEWSLETTER FONTS COLOR	19.50
NIMBUS 1:RECORD KEEPER	93.80
NINJA MISSION	13.00
OBLITERATOR	*25.99*
OGRE	32.46
ONE-ON-ONE	14.40
ONLINE 2.0	43.56
OO-TOPOS	19.48
ORGANIZE	62.32
OUTLINE	31.25
PAGE FLIPPER	31.23
PAGESETTER	93.72
PALADIN	25.95
PAR HOME I	25.00
PAR HOME II	62.48
PAR REAL I	93.15
PASCAL	137.46
PCLO	199.95
PCLO +	399.95
PEOPLE METER	48.70
PERFECT SCORE	54.97
PERSECUTORS	13.23
PHANTASIE	27.47
PHANTASIE 3	24.95
PHASAR-FIN'L MGMT	62.48
PHOTON PAINT	*64.96*
PHOTOSYNTHESIS	97.95

PINBALL I.Q.	19.46
PINK PANTHER	28.56
PIXMATE	45.47
PLANET PROBE	19.46
PLUTOS	19.46
POLICE QUEST	CALL
PORTAL-ADVENTURE GAME	34.35
PORTS OF CALL	*29.71*
POWER PACK	22.95
POWERWINDOWS 2.0	62.46
PRE CALCULUS	36.33
PRINTMASTER PLUS	31.23
PRISM PLUS	45.43
PRO MIDI STUDIO	130.38
PRO VIDEO BULLETIN	25.17
PRO VIDEO CGI	144.00
PRO VIDEO FONT SET #1	72.00
PRO VIDEO FONT SET #2	72.00
PRO VIDEO FUTURE	25.17
PRO VIDEO PLUS	*184.95*
PRO VIDEO SHOW TIME	25.17
PROBABILITY THEORY	36.22
PROFESSIONAL PAGE 1.1	*247.50*
PROJECT D	31.23
PROWRITE 2.0	*78.10*
PUBLISHER PLUS	124.98
PUPPY LOVE	18.68
Q-BALL	21.41
QUARTERBACK	45.47
QUINTETTE	30.90
QUIZAM	23.10
R.R. AESOP'S FABLES	19.48
READ & RHYME	31.23
READ-A-RAMA	31.23
REASON:AT&T WRITERS W.B	271.56
RETURN TO ATLANTIS	34.32
ROAD TO MOSCOW	29.97
ROADWAR 2000	27.47
ROADWAR EUROPA	29.21
ROADWARS	23.95
ROCKFORD	23.95
ROLOBASE PLUS	58.46
ROMANTIC ENCOUNTERS	25.95
RUNTIME PACKAGE	103.10
SAF T NET HD BACKUP	32.46
SANTA PARAVIA & FIUMACCIO	19.46
SARGON III	35.75
FLIGHT SIM. II SCENERY DISKS	18.72
SCRIBBLE	62.32
SCULPT-3D	*69.95*
SDI	34.34
SEASONS AND HOLIDAYS	21.60
SEVEN CITIES OF GOLD	14.40
SHADOW GATE	31.23
SHAKESPEARE	146.25
SHANGHAI-STRATEGY GAME	27.46
SHERLOCK	27.00
SILENT SERVICE	25.95
SILICON DREAMS	19.95
SILVER 3-D	109.95
SINBAD & FALCON	34.34
SKYFOX 1.2	14.95
SLAYGON	22.07
SMOOTH TALKER	33.95
SOFTWOOD FILE	62.48
SOFTWOOD FILE SG	78.21
SOFTWOOD LEDGER V1.2	62.48
SOFTWOOD WRITER	62.48
SONIX (AEGIS)	49.98
SOUNDSCAPE UTILITIES 1	35.71
SOUNDLAB MIRAGE	209.95
SOUNDQUEST SYNTH EDITORS	CALL
SOUND OASIS	64.95
SOURCE LEVEL DEBUGGER	57.16
SPACE BATTLE	16.96
SPACE FLIGHT	19.46
SPACE MATH	29.95
SPACE PORT	27.38
SPACE RANGER	13.00
SPACEQUEST	33.00
SPELLBOUND	25.96
SPELLER BEE	31.25
SPELLING IMPROVEMENT	19.95
STAR GLIDER	30.90
STARFLEET I	36.30
STATION FALL	27.47
STELLAR CONFLICT	25.95

STOCK MARKET-THE GAME	16.21
STRIP POKER	27.46
STRIP POKER DATA DISKS	12.98
STUDIO FONTS V1 (COLOR)	19.50
STUDIO MAGIC	43.73
SUB BATTLE	CALL
SUPER HUEY-COPTER GAME	23.36
SUPERBASE PERSONAL	93.73
SUPERBASE PROFESSIONAL	*195.00*
SYMPHONY SONGS (EACH VOL)	15.95
SYNTHIA	59.95
T & L GALLERY	9.95
TALES FROM ARABIAN NIGHTS	31.95
TALKER-TALKING WP	48.10
TALKING COLORING BOOK	18.73
TASS TIMES IN TONETOWN	27.46
TELEGAMES	23.95
TELEWARS	24.97
TEMPLE OF APSHAI	27.46
TERRORPODS	25.77
TEST DRIVE	34.95
TEXTCRAFT PLUS	64.93
TEXTPRO	49.95
THAI BOXING	14.26
THE 64 EMULATOR	49.95
THE ACCOUNTANT	186.89
THE CALLIGRAPHER	62.50
THE CELEBRITY COOKBOOK	22.71
THE DEMONSTRATOR	21.85
THE DIRECTOR	45.47
THE EXPLORER	36.22
THE GRAPHICS STUDIO	33.12
THE MUSIC STUDIO	34.35
THE PAWN	30.90
THE SURGEON	31.23
THE WORKS	124.97
THEXDER	23.95
THREE LITTLE PIGS	19.48
THREE STOOGES	*35.95*
THUNDERBOY	22.71
TIME BANDITS	22.09
TRANSCONTINENTAL RAILROAD	25.96
TRIGONOMETRY	36.22
TRINITY	27.47
TRUE BASIC	68.72
TRUESTAT	57.97
TURBO	CALL
TURBO PRINT	32.95
TURBO SILVER CONVERSION	12.96
TV SHOW	65.01
TV TEXT	62.32
TXED PLUS	51.95
TYPING TUTOR WORD INVADER	22.73
ULTIMA III	28.57
UNCLE D CON SOUND TRATION	25.97
UNINVITED	34.34
VADER	19.46
VAMPIRE'S EMPIRE	29.21
VIDEO EFFECTS 3D	129.96
VIDEO MASTER	62.48
VIDEO VEGAS	24.10
VIDEOSCAPE 3D	124.98
VIDEOTITLER 1.1	*99.95*
VIP PROFESSIONAL	103.10
VIZAWRITE	93.75
VOCABULARY IMPROVEMENT	19.95
VYPER	21.95
WBEXTRAS	24.95
WESTERN GAMES	31.95
WINDOW PRINT II	22.75
WINNIE THE POOH	16.50
WINTER CHALLENGE	9.95
WINTER GAMES	27.46
WISHBRINGER	10.25
WORD MASTER	29.95
WORD PERFECT	*219.00*
WORLD GAMES	27.46
WRITE 'N' FILE	59.95
X-CAD	455.00
ZING	49.98
ZING KEYS	31.25
ZORK TRILOGY	48.10
ZUMA FONTS VOLS 1,2,3	21.85

HARDWARE

ALEGRA W/0K (A1000)	166.95
ALPS ALQ200 PRINTER	599.00
ALPS ALQ300 PRINTER	799.00
AMIGA LIVE!	270.00
AMIGA 1680 MODEM	110.40
AMIGA 2052 2 MEG CARD	*399.00*
AMIGEN GENLOCK	149.95
ASDG 8 MEG BOARDS W/0K	399.00
AVATEX 1200E MODEM	81.25
AVATEX 2400 BAUD MODEM	229.18
BYTE BOX 0K-RAM OPTIONAL	249.00
C LTD SCSI CNTRLR A1000	219.95
CA-880 FLOPPY DRIVE	219.00
CASIO KEYBOARDS	CALL
COPY STAND, 2 LIGHTS	49.35
ECE MIDI 500/ 2000	48.71
ESCORT 2 A1000	CALL
ESCORT 500	CALL
EXP-1000 1M POPULATED	479.95
EXP-1000 1M UNPOPULATED	219.95
EXP-500 512K RAM EXP	149.00
FLICKER FIXER (HARDWARE)	*499.00*
FUTURE SOUND-AUDIOSAMPLER	142.20
HURRICANE 16MHZ TURBO CRD	CALL
IMPACT SCSI/1M RAM	541.20
IMPACT SCSI/512K RAM	429.95
KWICK START	149.47
MICRON 2 MEG FOR A2000	*399.00*
MICRON 2 MEG FOR A500	499.95
MIDI GOLD	64.20
MINISCRIBE 20MB 3.5" FAST	329.00
MINISCRIBE 8051S SCSI 40M	615.00
NEC COLOR P6	621.20
NEC P2200 PRINTER	418.75
NEC P6 PRINTER	499.95
NEC P7 PRINTER	739.95
OKIMATE 20/PLUG N PRINT	199.00
OVERDRIVE HD CONTROLLER	199.95
PANASONIC WV1410 CAMERA	224.96
PERFECT SOUND DIGITIZER	67.47
PERFECT VISION	169.95
PRACT. PER. 2400B MODEM	199.95
PRODRIVE	219.00
PRODRIVE 2000	149.00
QUANTUM PRODRIVE 80S	1199.00
SCRIBE-CARD 30 FOR 2088D	420.00
SPIRIT INBOARD A500	CALL
SPIRIT INBOARD A1000	CALL
STAR NB24-10	545.96
STAR NX1000 PRINTER	199.00
STAR NX1000 RAINBOW	249.95
STARBOARD 2/ACCESSORIES	CALL
SUBSYSTEM 500	199.95
SUPERGEN	699.00
SUPRA 2400 MODEM	152.49
SUPRA DRIVE 20 MEG A500/A1000	699.00
SUPRA DRIVE 20 MEG A500	699.00
SUPRA DRIVE 30 MEG A500	859.00
SUPRA DRIVE 60 MEG HD	1499.00
XEROX 4020 INK JET COLOR	1140.00

ACCESSORIES

AMIGA DUST COVERS	CALL
AMIGA 500 MONITOR STAND	29.95
AMIGA INTERACTIVE CABLE	4.10
AMIGA LIGHT PEN	97.47
AVATEX 1200E MODEM	81.25
AVATEX 1200HC MODEM	119.99
C-VIEW A500 COLOR COMPOS.	36.19
CASIO AS-20 POWER SPEAKER	89.95
COPY STAND,2 LIGHTS, STD	49.35
CURTIS DIAMOND	34.03
CURTIS DIAMOND PLUS	46.42
CURTIS EMERALD	40.22
CURTIS PHONE LINE SURGE	12.36
CURTIS RUBY	58.81
CURTIS SAPPHIRE	57.04
DELUXE MIDI INTERFACE	59.96
DISKETTE LABELS 100	8.95
DOCUMATE 2	10.36
DRIVE CLEANING KIT	6.95
DRIVE EXTENSION CABLE	29.95
EPYX 500XJ JOYSTICK	13.69
FLICKER MASTER	13.95
FUJI MF2DD 10 PACK	19.95

Creative Computers is both a mail order company with a store's support and two store showrooms with mail order prices. If possible, drop by our store and you will be **Amazed!**

Store front addresses:

318 Wilshire Blvd, Santa Monica, CA 90401
Tues. - Sat. 11-7 p.m., Sun. 11-5 p.m. phone: (213) 394-7779
4453 Redondo Beach Blvd., Lawndale, CA 90260
Mon - Sat. 11-7 p.m. phone: (213) 542-2292

MINIMUM ORDER: $20
SHIPPING INFO: 1% surcharge for Visa and MasterCard; call for shipping rates.
RETURN POLICY: Defective merchandise under warranty will be repaired or replaced. Returned product must be in original package. We do not offer any refund on defective products or for products that do not perform satisfactorily. We make no guarantees for product performance.
CONDITIONS: Creative Computers reserves the right to limit the sale of any items to local in-person pick-up only. Prices subject to change without notice.
WE ALSO RUN A 24 Hr. BBS: Call (213) 394-5988 with your modem.

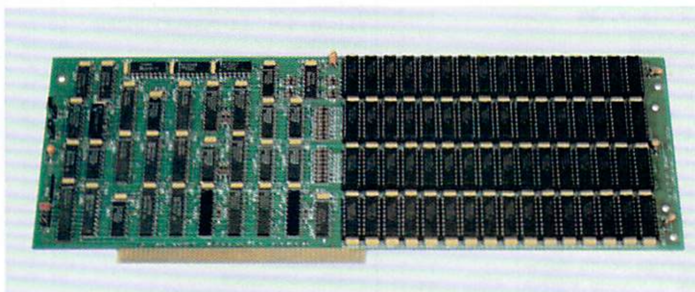
Circle 199 on Reader Service card. **Visit one of our stores soon!!**

CHANGE PARTNERS

ALL AMIGA parallel ports were not created equal, but Amicore International has three solutions. The **Transvestor 1000** ($19.90) hooks up to the A1000 and lets you hook up products designed for the A500 and A2000 parallel ports. **Transvestor 2500** ($19.90) does just the opposite: it connects the A500 or A2000 to most A1000-style peripherals, and the plus in **Transvestor 2500 Plus** ($49.95) means you get complete compatibility with all A1000 devices, and an external power supply, too, to ward off voltage problems. Pull the ol' switch-a-roo by calling Amicore International, 451 Center Street, Ludlow, MA 01056, 413/589-7879.

RAH-RAH FOR RAM

TWO, FOUR, SIX, eight; how many megabytes will you take? If you need an upgradable memory expansion board for your A2000, then shake a pom-pom for **ProRAM 2000**. Because you can add to the $399.95 unpopulated board in two-meg increments, it is compatible—in six-meg form—with the A2088 Bridgeboard. ProRAM 2000 uses one-megabit DRAM (instead of 256K) chips, and includes a dynamic RAM controller. The auto-configuring boards are compatible with AmigaDOS 1.2 and 1.3 auto-config software. For more information talk to the team at Progressive Peripherals, 464 Kalamath St., Denver, CO 80204, 303/825-4144.



Tackle up to eight megs of memory with ProRAM 2000.

FOUR FOR FUN

CAN YOU TAKE off and land on an aircraft carrier, fight enemy aircraft, track and destroy U-boats, and dive bomb E-boats and mine fields? If you're up to the challenge, $39.95 puts you in the cockpit of **Dive Bomber**.

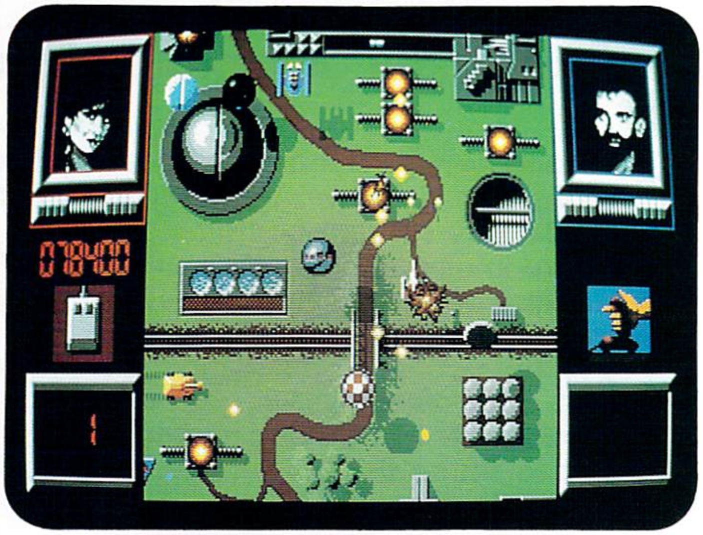
If you think you're the baddest cat in town, you'll need to prove it in four events, including sewer swimming and bowling against the Bulldog, in **Street Cat**. Strut your stuff for $24.95

4×4 Off-Road Racing lets you design your own rig and drive it into a rough-and-tumble terrain. You'll have to plan a strategy and consider topography, temperature, and weight, before you wheel your way around obstacles in a race against maniacal opponents. Gas up and go for $39.95.

In **Death Sword** ($24.95) you must go metal-to-metal with guards of an evil sorcerer in a variety of settings. Get all the fun from Epyx, PO Box 8020, Redwood City, CA 94063, 415/366-0606. ►

SHOOT THE SHADOW

CAN YOU OUTGUN the enemy? **Black Shadow** challenges arcade buffs to save the earth from an invading asteroid. You'll need to bomb key installations, whether you select one- or two-player mode. Start blasting for $34.95 at Scorpion, 19 Harbor Dr., Lake Hopatcong, NJ 07849, 201/663-0202.



Don't be afraid of your own Black Shadow!

TWIN X'S AND TRIPLE E'S

AS HOST FOR the industry-standard IEEE 959 expansion module interface (also known as iSBX), ASDG's **Twin-X** board intends to pave the way for industrial, academic, and research uses of the Amiga. Twin-X allows you access to the hundreds of IEEE 959 modules that are available for nearly every common form of input/output, control, and computing function. Each auto-config board can host one double-wide or two standard modules (and each A2000 can accommodate up to five Twin-X's). ASDG will help you identify the module to fit your application. Contact them at 925 Stewart St., Madison, WI 53713, 608/273-6585.

HANDS-ON OPERATION

FINGERPAINTING has gone hi-tech with a multitasking, integrated, touch-screen system—**Future Touch**. Just touch the the screen for any application; the TouchSystem software controls all screen activity. To create new applications, use the TouchMaker software. The whole setup (including hi-res touch-screen color monitor, floppy drive, 20-meg hard drive, mouse, keyboard, and an Amiga 2000 with a 68000-based CPU and three megs of RAM) is $3500. A scaled-down version with specially-configured monitor plus desktop video, graphics design, 3-D animation, and audio-visual scripting software support is in the works for those who already own A2000s. For details, get in touch with Business Technology Services at 485 Fifth Ave., Suite 1042, New York, NY 10017, 212/682-2910. ►

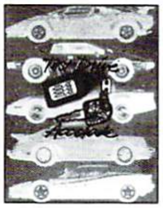
SOFTWARE DISCOUNTERS OF AMERICA

S.D. of A.

For Orders Only—1-800-225-7638
PA Orders—1-800-223-7784
Customer Service 412-361-5291

- Free shipping on orders over $100 in continental USA
- No Surcharge for VISA/MasterCard
- Your card is not charged until we ship

ACCOLADE

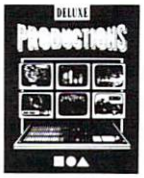


Hit warp speed in a Ferrari Testarosa, bring your oil to a boil in a Lamborghini Countach...
Test Drive
List Price $44.95
Our Discount Price $25

ABACUS
Assem Pro $49
Becker Text $89
Data Trieve $49
Text Pro Word Processor $49
*Abacus Books in Stock! Call
ACADEMY
Typing Tutor $23
ACCESS
World Class Leader Board $29
ACCOLADE
Graphics Studio $39
Hardball $25
Mean 18 Golf $25
Famous Course #2 for M18 $14
Test Drive $25
ACTION WARE
Capone $25
ACTIVISION
Gee Bee Air Rally $25
Shanghai $25
AEGIS
Animator w/Images $84
Audio Master $39
Diga $49
Draw Plus $149
Images $25
Ports of Call $32
Sonix $49
Videoscape 3D $129
Video Titler $89
ARCADIA
Aaargh $23

Pub Games .... Call
Roadwars $23
Rockford $26
ARTWORX
Bridge 5.0 .... $23
Centerfold Squares $19
Linkword French $19
Linkword German $19
Linkword Italian $19
Linkword Spanish $19
Strip Poker $25
S.P. Data Disk #4 .... $14
S.P. Data Disk #5 .... $14
Thai Boxing $9.88
BAUDVILLE
Video Vegas $23
BYTE BY BYTE
Animate 3-D $99
Sculpt 3-D $65
CINEMAWARE
Defender of the Crown . $32
King of Chicago $32
Rocket Ranger $32
S.D.I. $32
Sinbad: Throne of the Falcon $32
Three Stooges $32
CONSTELLATION
City Defense $14
Emerald Mine $14
Fortress Underground $14
Gnome Ranger $14
Karate King $14
Larrie & the Ardies $14
Mission Elevator $14

ELECTRONIC ARTS



16 color, high-resolution graphics animation solution for video professionals. Broadcast quality image generation make this the ultimate video tool. Includes 2 free art disks!
Deluxe Productions
List $199.95
Our Discount Price $129

Persecutors $14
Space Port $14
DESIGNWARE
Designasaurus .... Call
DIGITAL SOLUTIONS
LPD Writer $42
ELECTRONIC ARTS
Arctic Fox $26
Bard's Tale $32
Bard's Tale 2 .... Call
Chessmaster 2000 .... $29
Deluxe Music Const. $65
Deluxe Paint 2 .... $84
Deluxe Photo Lab .... Call
Deluxe Print 2 .... Call
Deluxe Productions $129
FA/18 Interceptor $32
Ferrari Formula One $32
Instant Music $32
Intellitype $32
Marble Madness $32
Return to Atlantis $32
Weaver Baseball $32
World Tour Golf .... Call
EPXY
California Games .... Call

Basketball: Two-on-Two $29
GFL Champ. Football $29
GOLD DISK
Professional Page .... Call
INFOCOM
Beyond Zork $32
Leather Goddesses $25
Lurking Horror $25
Sherlock: Riddle of the Crown Jewels $25
Zork Trilogy $32
INKWELL
Amiga Light Pen $89
INTERSTEL
Empire $32
MICHTRON
Gold Runner $25
Insanity Fight $25
Karate Kid 2 .... $25
Leatherneck $25
Slaygon $25
Tanglewood $25
Time Bandit $25
MICRO ILLUSIONS
Blackjack Academy $25
Ebonstar $25



The Ultimate Joystick!
500XJ Joystick
List $19.95
Our Discount Price $14
(for right-handed players only!)

Death Sword $14
Destroyer $25
Sub Battle Simulator $25
Temple Apshai Trilogy $14
Winter Games $14
World Games $25
FTL
Dungeon Master $25
FIREBIRD
Carrier Command .... Call
Guild of Thieves $29
Jinxter $25
Pawn $19
Starglider $29
Universal Military Simulator Call
FIRST BYTE
First Letters & Words $32
First Shapes $32
Kid Talk $32
Math Talk $32
Math Talk Fractions $32
Smooth Talker $32
Speller Bee $32
GAMESTAR
Champ. Baseball $25
GBA Championship

Faery Tale Adventure $32
Fire Power $16
Galactic Invasions $16
Photon Paint $65
MICROPROSE
Silent Service $25
MICRO SYSTEMS
Scribble W.P. $49
The Works $119
MINDSCAPE
Balance of Power $32
Blockbuster $25
De Ja Vu $32
Harrier Combat Sim. $32
Into the Eagle's Nest $25
Perfect Score SAT $49
Shadowgate $32
Uninvited $32
NEWTEK
Digi-Paint $39
Digi-View 3.0 .... Call
Video Toaster .... Call
NORTHEAST
Publisher Plus $59
OMNITREND
Breach $25

Datasoft®



As captain of Russia's newest state-of-the-art sub your goal is to cross the Atlantic and rendevous with the American Navy.
Hunt for Red October
List $49.95
Our Discount Price $32

Breach Scenario Disk $16
Paladin $25
ORIGIN
Moebius $39
Ultima 3 .... $25
Ultima 4 .... Call
PAR SOFTWARE
Express Paint 2.0 .... $65
PARAGON
Alien Fires $26
PROFESSIONAL
Fleet Check $25
PROGRESSIVE
CLI-Male $25
Disk Master $32
Dr. Term Professional $59
Intro Cad $49
Micro Lawyer $39
Pix Mate $44
Superbase Professional . $189
SIERRA
Black Cauldron $26
King's Quest 1, 2 or 3 $32 Ea.
Leisure Suit Larry $26
Space Quest $32
Thexder $23
SOFT LOGIK
Publishing Partner Professional .... Call
SUBLOGIC
Flight Simulator $32
Jet $32
Scenery Disks .... Call

THREE-SIXTY
Dark Castle $25
THUNDER MOUNTAIN
Winter Challenge $9.88
UNICORN
Adv. of Sinbad $29
Aesop's Fables $29
All About America $35
Animal Kingdom $29
Decimal Dungeon $29
Fraction Action $29
Kinderama $29
Math Wizard $29
Read & Rhyme $29
Read-A-Rama $29
Word Master $29
UNISON WORLD
Art Gallery 1 or 2 .. $19 Ea.
Art Gallery: Fantasy $19
Fonts & Borders $23
Print Master Plus $25
ZUMA
TV Show $59
TV Text $59
ACCESSORIES
Compuserve Starter Kit . $19
Disk Case (Holds 45) .. $6.88
Disk Drive Cleaner ... $6.88
Dow Jones Starter Kit .. $19
Epyx 500 XJ Joystick ... $14
Suncom Joysticks .... Call
Supra Hard Drives .... Call
Wico Bat Handle $17
Wico Ergostick $19

Unison World
PrintMaster Plus.



Everything you need to design and print: Banners, Calendars, Custom Stationery, Flyers, Greeting Cards, Invitations and Posters.
Print Master Plus
List $39.95
Our Discount Price $25

P.O. BOX 111327—DEPT. AM—BLAWNOX, PA 15238

*Please Read The Following Ordering Terms & Conditions Carefully Before Placing Your Order: Orders with cashiers check or money order shipped immediately on in stock items! Personal & Company checks, allow 3 weeks clearance. No C.O.D.'s! Shipping: Continental U.S.A.-Orders under $100 add $3; free shipping on orders over $100. AK, HI, FPO, APO-add $5 on all orders. Canada & Puerto Rico-add $10 on all orders. Sorry, no other International orders accepted! PA residents add 6% sales tax on the total amount of order including shipping charges. CUSTOMER SERVICE HOURS: Mon.-Fri. 9 AM-5:30 PM Eastern Time. REASONS FOR CALLING CUSTOMER SERVICE—412-361-5291 (1)Status of order or back order (2)if any merchandise purchased within 60 days from S.D.of A. is defective, please call for a return authorization number. We will not process a return without a return auth. #! Defective merchandise will be replaced with the same merchandise only. Other returns subject to a 20% restocking charge! After 60 days from your purchase date, please refer to the warranty included with the product purchased & return directly to the manufacturer. Customer service will not accept collect calls or calls on S.D.of A.'s 800# order lines! Prices & availability are subject to change! New titles are arriving daily! Please call for more information. NEW, MORE CONVENIENT ORDER LINE HOURS: Mon.-Thurs. 8:30 AM-7:00 PM Fri. 8:30 AM-5:30 PM Sat. 10:00 AM-4:00 PM Eastern Time.

Circle 128 on Reader Service card.

SHADY DEAL

WHEN YOU GO shopping for optical accessories, don't forget your Amiga. Here's a new pair of shades:

The **Perfect-Vu** screen filter, with its light-diffusing characteristics, claims to enhance the clarity and contrast of your video display. It's available in a variety of sizes for $29.95 from PerfectData Corp., 1825 Surveyor Ave., Simi Valley, CA 93063, 805/581-4000.

If you want a souped-up filter, cast your eyes toward the **NoRad dB60**. This unit ($129) is designed to eliminate static electricity and dust build up, block electromagnetic radiation, and eliminate glare and reflection. See your way clear to Brookfield Communications, 3820 Griffith View Dr., Los Angeles, CA 90030, 213/669-0030, 800/533-3260.

SAY CHEESE!

COMBINE THE features of a paint program, color processor, and poster maker, and what do you get? **DeluxePhotoLab**. DeluxePhotoLab, companion to DeluxePaint II (another Electronic Arts family member), lets you work on 12 pictures simultaneously, cutting and pasting between them. The digital-retouching program offers eight resolution levels in which you can create and manipulate images using any graphics mode (HAM and Extra Halfbrite included), and 18 paint options for alterations. You can produce posters of up to 10 × 10 feet with any Amiga-supported printer, too. The Lab sells for $149.99 from Electronic Arts at 1820 Gateway Dr., San Mateo, CA 94404, 415/571-7171.

INTERNAL AFFAIRS

THE LATEST ENTRIES from Great Valley Products are expansion devices for the A2000.

The auto-configuring, Hayes-compatible **Impact Modem2400-1** fits into an A2000 slot, and supports data rates of 2400, 1200, 600, and 300 bps, as well as Bell 103, 212A, and CCITT V.21, V.22 (A and B), and V.22bis standards. It also incorporates a digital signal processor for reliability, and because the circuitry automatically selects a communications standard and baud rate to correctly match the remote modem, all you need to do is dial (touch tone and pulse are both supported) and send.

A hard-disk on a card, the **Impact Autoboot Hardcard** is a combination ANSI X3T9.2-compatible SCSI controller and 20- or 45-megabyte hard disk. The hardcard auto configures the controller and leaves your peripheral bays free. It also offers two sockets for autoboot driver ROM/EPROMs, and supports the new 1.3 Fast File System. An 8K disk buffer is provided for 16-bit wide DMA data transfers.

Another **Impact SCSI/RAM Hard Disk Controller**, this time with two megabytes of memory, is available, too. Direct your questions about the RAM/Controller board ($360 unpopulated), the 20-meg ($599) or 45-meg ($850) Hardcard, and the Impact Modem ($249) to Great Valley Products, PO Box 391, Malvern, PA 19355, 215/889-9411, 800/426-8957. ►

WANT FONTS?

A THREE-DISK set, **Kara Fonts** offers ten textural typefaces in two sizes. Styles include chrome, marble, wood, cast, and chisel serif, and each is drawn in relationship to a consistent light source for a dimensional feel. Four of the styles have one or two pixel outlines which you can drag in any direction to create a range of effects. Kara Fonts sells for $79.95 from Kara Computer Graphics, 6365 Green Valley Circle No. 317, Culver City, CA 90230, 213/670-0493.

CHANCES ARE . . .

WANT TO INCREASE your lottery-winning odds? While the producers of **Lottery Magic** make no guarantees, they provide statistical information on most legal lottery systems in the US. The program contains seven wheeling systems, computes hot and cold numbers, and keeps track of up to 50 different lotteries. Feel lucky? Lottery Magic is $24.95 from Slipped Disk Inc., 31044 John R, Madison Heights, MI 48071, 313/583-9803.

A BETTER MOUSETRAP

IF YOU NEED to snap your workstation into shape, set up a **Mousetrap**. The unit fits all mousepads, and keeps your mouse enclosed yet accessible. To top it off, the adjustable swivel stand that holds your manuscript (it can even handle heavy books and binders) lifts up to provide a storage compartment for disks and papers. $58.60 includes shipping and handling from Gered Corp., 2401 N.E. Cornell Rd., Suite 125, Hillsboro, OR 97124, 503/228-4118, 800/852-TRAP.

ANYBODY HOME?

LIGHTS, APPLIANCES, action! Put your Amiga in charge while you're away with the **PowerMaster** home remote-control system. The program works with the X-10 Home Computer Interface; just plug your electrical devices into X-10 modules (available at electronics and department stores), and then into the sockets. Define module names and locations (using menus, requesters, and gadgets) for PowerMaster, and specify up to 128 on, off, and dim times for 256 modules! PowerMaster will even accommodate various time definitions for different times of the year. Get the program by itself ($24) or with the X-10 interface ($51); plug in to Compplications, 1727 Parkview, Redlands, CA 92374, 714/794-5311.

ARCADE ACTION

IF YOU CAN'T get enough of arcade games, Constellation Software is at your service, not only with options, but affordability, too. Their latest titles, all at $19.95, include **Crystal Hammer**, a Breakout-type barrier-bouncer with 30 levels, and **Way of the Little Dragon**, an eight-level karate adventure with four opponents for one or two players. **Mission Elevator** challenges you to collect clues and make it to the 62nd floor of a hotel to diffuse the bomb planted there. **Spaceport** lets you navigate the interior of an asteroid as pilot of a spacecopter. No need to search the heavens, Constellation Software is at 17 Saint Mary's Court, Brookline, MA 02146, 617/731-8187. ■

WE SELL THE BEST - FOR LESS!

✓ Denotes new products

SOFTWARE

ABACUS
✓ Assempro ... $60
✓ Becker Text ... $90
✓ Books ... Call
Data Retrieve ... $48
Text Pro ... $48

ABSOFT
AC/Basic ... $117
AC/Fortran ... $180

ACCESS SOFTWARE
Leader Board ... $24
Tournament Disk ... $12

ACCOLADE
Mean 18 ... $27
Famous Courses Vol. 2 . $12
✓ Fight Night ... Call
✓ Graphic Studio ... $36
Hard Ball ... $27
Test Drive ... $27

ACTIONWARE
✓ Capone ... $24
✓ Phaser Gun ... Call
✓ P.O.W. ... Call
✓ Creature ... Call

ACTIVISION
Game-★ Basketball ... $27
Game-★ Baseball ... $27
Game-★ Golf ... $27
Game-★ Football ... $27
GB Air Rally ... $24
Hacker II ... Call
Infocom Titles!! ... 40% Off
Music Studio ... $30
Portal ... $30
Shanghai ... $24

ADDISON-WESLEY
Hardware Manual ... $20
Intuition Manual ... $20
Rom Kernal Manual ... $24
Rom Manual Exec ... $16

AEGIS
Animator/Images ... $84
Art Disk ... $24
Arazok's Tomb ... $30
✓ Audiomaster ... $36
Diga ... $48
Draw ... $75
Draw Plus ... $149
Images ... $24
Impact ... $54
✓ Port of Call ... $24
Soni ... $48
Videoscape 3D ... $120
✓ Video Titler ... Call

AMIGA
Assembler ... $60
Amiga C ... $90
✓ 1.2 Enhancer ... 10.
Graphic Craft ... $20
Lisp ... $120
MindWalker ... $30
Pascal ... $120
Textcraft Plus ... $54

ANCO
✓ Harrier Mission ... $15
✓ Formula 1 Racing ... $15
✓ HR35 ... $15
✓ Karting Grand Prix ... $15
✓ Las Vagas ... $15
✓ Karate Kid ... $15

APPLIED VISIONS
✓ Sargon III ... $30

ARTWORX
✓ Bridge 5.0 ... $21
Linkword Languages ... $18
Strip Poker ... $24
Strp. Pokr Data Disk 5 . $12

ASDG
FACC II ... $21
✓ Cube Master ... $21

ASO
Brush Works (1 or 2) ... $18
EFX ... $180

BANTAM
AmigaDOS Express ... $20
DOS Manuals ... $22

BAUDVILLE
✓ Award Maker ... $30
Video Vegas ... $24

B.E.S.T.
Business Mgmt ... Call
✓ General Ledger ... Call

BROWN WAGH
✓ Express Paint (NEWV) . $60
✓ Publisher Plus ... $60
✓ Softwood File IIsg ... Call
✓ TV Show ... $60
TV Text ... $60
✓ Word Plex ... $24
✓ Write & File ... $60
Zuma Fonts (Each) ... $21

BYTE BY BYTE
Animate 3-D ... $95
InfoMinder ... $60
Sculpt 3-D ... $65

CAPILANO
Logic Works ... $60

CENTRAL COAST
DISK to DISK ... $30
DOS 2 DOS ... $33
Precisely ... $60
✓ Quarterback ... $42

CINEMAWARE
✓ King of Chicago ... $30
✓ S.D.I. ... $30
✓ Sinbad ... $30
✓ 3 Stooges ... $30
✓ Rocket Ranger ... $30

COMMAND SIMULATIONS
✓ Blitzkrieg ... $30

DIGITAL CREATIONS
✓ D' Buddy ... $48
Digital Link ... $42
Gizmos 2.0 ... $42

DIGITAL SOLUTIONS
LPD Writer ... $42

DIGITEK
✓ Amegas ...
✓ Hollywood Poker ...
✓ Vampires Empire ...

DISCOVERY
✓ Amnix ... Call
Arkanoid ... $30
✓ DX Series ... Call
Grabbit ... $18
Marauder II ... $24
✓ Zoom ...

DISK CO.
✓ Critics Choice ... $150
Kind Words ... $60

DR. T MUSIC SOFTWARE
✓ K.C.S. ... $150

EAGLE TREE
Butcher 2.0 ... $22

EIDERSOFT
✓ Amiga Karate ... $21

ELECTRONIC ARTS
Buy 2 get 1 Free/Call
✓ AAA RGH ... $23
Adv. Constr. Kit ... $14
✓ Alien Fires ...
✓ Alternate Reality (city) . $26
Artic ... $26
✓ Awesome Arcade Pk. ... $32
Bard's Tale ... $32
✓ Battle Droidz ... $23
Black Cauldron ... $26
ChessMaster 200 ... $29
Deluxe Music ... $62
Deluxe Paint II ... $80
Deluxe Video 1.2 ... $80
✓ Deluxe Photo Lab ... $62
✓ Deluxe Productions ... $122
Deluxe Video 1.2 ... $80
✓ Deluxe Write ... $62
✓ Empire ... $32
✓ Ferrari Formula 1 ... $32
Financial Cookbk ... $14
✓ Hunt For Red Oct ... $32
Instant Music ... $32
King's Quest ... $32
✓ Life and Death ... $29
✓ Mad Libs ... $12

Marble Madness ... $32
✓ Mavis Beacon ... $29
✓ Monopoly ...
✓ Thexder ... $32
One on One ... $14
✓ Pub Games ... $23
✓ Return To Atlantis ... $32
✓ Road Wars ... $23
✓ Rockford ... $23
Skyfox ... $14
Skyfox II ... $26
Starfleet I ... $35
Ultima III ... $24
Space Quest ... $32
Lounge Lizards ... $32
Earl Weaver ... $32

EPYX
California Games ... $24
Destroyer ... $24
✓ Dive Bomber ... $24
Rogue ... $24
✓ Street Cat ... $15
✓ Street Sport Basketball . $24
Sub Battle ... $27
Summer Games ... $24
Temple of Apshai ... $24
Winter Games ... $24
World Games ... $24
✓ 4x4 Road Racing ... $24

FIREBIRD
Guild of Thieves ... $27
✓ Jinxter ... $24
Pawn ...
Knight of Orc ... $24

FINALLY TECHNOLOGIES
✓ Animotion ... $60
Talker ... $42
Phasar ... $60
Senor Tutor ... $30

FIRST BYTE
First Letters & Words . $30
First Shapes ... $30
Kid Talk ... $30
Math Talk ... $30
Math Talk Fractions ... $30
Smoothtalker ... $30
Speller Bee ... $30

FREE SPIRIT
✓ Ultimate Dos Utilities ... Call

FUTUREWORKS
LexCheck ... $26

GIMPEL
Lint ... $80

GOLD DISK
✓ Color Separator ... Call
✓ Comic Setter ... $60
Font Set 1 ... $25
Gold Spell ... $27
Laser Script ... $27
Page Setter ... $90
✓ Pg. Setter Prof ... $240

GRAPHIC EXPRESSIONS
Girls ... $12

HAITEX
✓ A-DRV ... $48
HiCalc ... $36

HASH
Animator Apprentice . $180
✓ Animator Apprentice Jr. . Call
✓ Animator Flipper ... $24
✓ Share Libreries ... Call

HYPERTEC
GOMF ... $24

IMPULSE
✓ Diamond ... Call
Prism ... $42
Silver ... $108

INFINITY
✓ Galileo II ... $42
✓ Grand Slam Tennis ... $30
Hot Licks ... $24
Shakespeare ... $135

INFOCOM
✓ Beyond Zork ... $30
✓ Sherlock Holmes ... $24

INNOVISION
✓ Video Effects 3D ... Call

INOVATRONICS
Power Windows ... Call

INTELLIGENT MEMORY
Galaxy Fight ... $21

Garrison ... $35
✓ Garrison II ... $35
Mousetrap ... $14
✓ Turbo Print ... Call

INTERACTIVE SOFTWORKS
Calligrapher ... $60
✓ Calligrphr W/Fnt Mvr ... $78
✓ Lion Fonts ... $36
Newsletter Fonts ... $18
Studio Fonts ... $21

ISM
Surgeon ... $30

JAGWARE
Alien Fires ... $24

JDK IMAGES
Pro Video CGI ... $120
✓ Pro Video Plus ... Call
Font Library 1 ... $65
Font Library 2 ... $65

JHM
Talking Color Book ... $18

KARA
✓ Kara Fonts ... $48

KFS
✓ Accountant ... $180

LATTICE
C - Regular ... $147
C - Professional ... $260
dbD III Library ... $100

LION'S AMIGA ART STUDIO
Font Sets 1 & 2 ... $25
Newsletter Fonts ... $25

MANX
Aztec C - Comm ... $310
Aztec C - Devel ... $195
Aztec C - Prof ... $130
Source Level Debug r . $49

MASTERTRONIC
✓ Fued ... $15
✓ Ninja Mission ... $15
✓ Space Ranger ... $15

MERIDIAN SOFTWARE
✓ Demonstrator ... $24
Zing ... $48
Zing Keys ... $30
✓ Zing Spell ... $30

MERRILL WARD
✓ Celebrity Cookbook ... $21

METACOMCO
Assembler ... $60
Lisp 1.3 ... $120
Pascal ... $60
Shell ... $42
Toolkit ... $30

METADIGM
MetaScope ... Call
✓ MetaScope Debugger ... $59

MICRO DEAL
Air Ball ... $24
Cashman ... $18
Gold Runner ... $24
Karate Kid II ... $24
✓ Slaygon ...
Time Bandits ... $24

MICRO ILLUSIONS
Black Jack Academy ... $24
Dynamic Word ... $120
Disc.-Math/Spell (each) . $24
Dynamic CAD ... $300
✓ Ebon Star ... $24
Faery Tale Adv ... $30
Fire Power ... $15
Galactic Invasion ... $15
Land of Legends ... $30
✓ Music X ... $180
✓ Photon Paint ... $60
✓ Photon Video ... Call
✓ Planetarium ... Call
✓ Romantic Encounter ... Call
✓ Turbo ... $15

MICRO MAGIC
Forms in Flight II ... $72

MICROPROSE
Silent Service ... $24

MICROSEARCH
City Desk 2.0 ... $120
Desktop Artist #1 ... Call
Head Coach ... $30

MICROSMITHS
TxEd Plus ... $48

MICROSYSTEMS SW
Analyze 2.0 ... $60

BBS-PC ... $60
✓ Excellence! ... $180
Flipside ... $30
On-line ... $42
Organize ... $60
Scribble ... $60
The Works ... $120

MIMETICS
✓ Capture ... $120
✓ 3 Demon ... $65
✓ Framebuffer ... $420
Midi Interface ... $43
Sound Sampler ... $80
Pro Midi Studio ... $125

MINDSCAPE
Balance of Power ... $30
✓ Block Buster ... $30
Bratacus ... $30
Deja Vu ... $30
✓ Gauntlet ... $30
Halley Project ... $27
✓ Harrier Combat ... $30
✓ Ice Hockey ... $30
✓ Indoor Sports ... $30
✓ Into Eagle's Nest ... $30
King of Chicago ... $30
✓ Misc Socker ...
Plutos ... $18
✓ Q Ball ... $18
Racter ... $27
SAR Preparation ... $48
Shadowgate ... $30
Sinbad ... $30
✓ Superstar Ice Hockey ... $30
Uninvited ... $30

MINDWARE
Descartes ... $18
Holmes ... Call
Page Flipper ... $30
✓ Pg. Flipper Plus F/X ... Call

NEW HORIZONS
✓ Deluxe Help/Calligr ... $27
Flow ... $60
✓ Pro Write 2.0 ... $75

NEWTEK
A500 Adapter ... $20
✓ Digi-Droid ... $62
Digi-Paint 2.0 ... $36
DigiView 2.0 ... $130

NEW WAVE
Dynamic Drums ... $48
✓ Dynamic Studio ... Call

NORTHEAST SOFTWARE GROUP
Order ... $30
Publish ... $120

OMNITREND
✓ Breach ... $24
✓ Paledin ...
✓ Scenerio Disk ... $15

OPCODE SYSTEMS
✓ Music Mouse ...

ORIGIN SYSTEMS
✓ AutoDuel ... $30
Ogre ... Call
Moebius ... $36
Ultima III ... $24
Ultima IV ... $36

OXXI
✓ Benchmark Mod-2 ...
✓ Libraries ... $60
Maxiplan 500 ... $90
Maxiplan Plus ... $120
✓ Nimbos ... $90

PECAN SOFTWARE
UCSD Pascal ... $60

PDJ SOFTWARE
✓ AiRT ... Call

POLYGLOT SOFTWARE
Crossword Creator ... $20
Dominoes ... $15

PROGRESSIVE
CLI-Mate ... $24
✓ Dr. Term Prof ... $60
✓ IntroCad ... $48
Logistix ... $80
MicroLawyer ... $36
✓ PrixMate ... $42
Superbase ... $80
✓ Superbase Prof ... $180

Vizawrite ... $80

PSYGNOSIS
Barbarian ... $24
✓ Deep Space ...
✓ Obliterator ... $24
Terror Pods ... $24
RAINBIRD
✓ Carrier Command ... Call

READY SOFT
The 64 Emulator-2 ... $60
RIGHT ANSWERS GROUP
✓ Director ... $42

SEDONA
Money Mentor ... $60

SOFT GANG
✓ Final Trip ... $15
✓ Space Fight ... $15
✓ Vader ... $15

SOFTLOGIC
✓ Galileo 2.0 ... $42
✓ Publ Partner Prof ... $120

SOFT TOUCH
Custom Screens ... $42
Paymaster Plus ... $90

SOFTWARE ADVANTAGE
✓ Investors Advantage ... $60

SOFTWARE VISIONS
MicroFiche Filer ... $60

SSI
Kampfgruppe ... $36
Phantasie ... $24
Roadwar Europa ... $24
Road War 2000 ... $24
Wrath of Nicodemus ... $24

SUBLOGIC
Flight Simulator ... $32
Jet ... $32
Scenery Disks (All) ... $17
European Scenery ... $17

SUNRIZE INDUSTRIES
✓ Adventure WkShop ... $36
✓ Elctr Color Splitter ... Call
Perfect Vision ... $160
Studio Magic ... $60

TAURUS
Acqusition ... $180
✓ X-CAD Designer ... $360

TDI
All Products Available
Modula II - Comm. ... $180
Modula II - Devel. ... $90
Modula II - Reg. ... $60

THE OTHER GUYS
Match-It ... Call
Omega File ... Call
Promise Spell Checker . $36
Reason ... Call
Synthia ... $60

THREE SIXTY INC.
Dark Castle ... $27

TITUS
✓ Krazy Cars ... $40

TOP DOWN
Footman ... $18
✓ Space Night ...
Vyper ... $18

TRUE BASIC
True Basic ... $60
9 Libraries (each) ... $30
Runtime ... $90

UNICORN
Aesop's Fables ... $30
All About America ... $36
Decimal Dungeon ... $30
Fraction Action ... $30
✓ Ghostly Grammer ... $30
Kinderama ... $30
✓ Land of the Unicorn ... $36
Read & Rhyme ... $30
Read-A-Rama ... $30
The Word Master ... $30

UNISON WORLD
Art Gallery 1,2 ... $18
Printmaster Plus ... $30

VIP TECHNOLOGY
Professional ... $90

WORD PERFECT INC.
✓ Library ... Call
Word Perfect ... $200

DISKS GENERIC	FUJI - MAXELL SONY - VERBATIM	POLAROID DATA RESCUE
5¼ DS/DD . 25¢ 200 Lot 3½ DS/DD . 1.30 30 Lot	3½ DS/DD 1.80 30 Lot	3½ DS/DD 1.50 30 Lot

Orders Only:

800-433-7756 MICROCOMPUTER SERVICES

In Michigan:

313-427-7713

Customer Service: **313-427-0267**

FAX: **313-427-7766**

Hours: Mon-Fri 10 a.m. - 8 p.m.
Saturday 10 a.m. - 6 p.m.

Circle 44 on Reader Service card.

Send Mail Orders To: **M.C.S.** 12864 Farmington Rd., Livonia, MI 48150
School P.O.'s Accepted - Call For Terms

No Surcharge for MC/VISA/DISCOVER   Sorry no walk in traffic
All returns must have RA#. Merchandise found defective will be repaired or replaced. We do not offer refunds for defective products or for products that do not perform satisfactorily. We make no guarantees for product performance. Any money back guarantee must be handled directly with the manufacturer. Call for shipping & handling info. Prices subject to change without notice. Shipping & Handling are not refundable.
12864 FARMINGTON ROAD, LIVONIA, MI 48150
We cannot guarantee compatibility.

DEALER INQUIRIES INVITED

HELP KEY

While the other editors were out in the sun, Lou Wallace put his sunglasses to good use, staring at the computer screen and answering questions.

By Louis R. Wallace

KEEP STILL

Q: *I am thinking of using a VGA monitor, such as the Zenith ZCM-1490 or the IBM Color Display 8513 with my Amiga. Are they Amiga compatible? If so, will they rid the interlaced mode of the troublesome flicker?*

A. Rahman
Binghamton, NY

A: I am not sure about Amiga compatibility with the specific monitors you mentioned, but Technical Editor Bob "Bit-Plane" Ryan is using an NEC MultiSync monitor (which is VGA compatiable) with his A2000. By itself, the monitor will not still the interlace flicker, but you can use it in conjunction with the flicker-Fixer board from Microway (see review, p. 64), which does completely remove the interlace flicker. The results are impressive, to say the least.

If you're willing to wait, Commodore is working on a set of Bi-Sync (dual frequency) monitors for use with the four-color, 640 × 400 non-interlaced mode on version 1.4 of the Amiga operating system. Neither the monitors nor 1.4 will be available before next year.

SUBROUTINE SUBTERFUGE

Q: *I am writing an Amiga Basic program that makes heavy use of Amiga Basic's subprogram module feature. The main program requires a lot of accuracy in its floating-point math, and I use the DEFDBL declaration to force it to use double precision as the default for most of its variables. However, there are some portions of the program that do not need this precision, but do need to be executed at top speed. These routines are within the subprograms, and I am using single precision and integer variables here. The problem is that many of my subprogram variables somehow end up as double precision! What is even more confusing is that they are not SHARED variables, and are supposed to be completely local to the subprogram! Am I crazy, or is this a bug in Amiga Basic?*

B. Cobham
Stillwater, OK

A: No, you are not crazy, and in fact my guess is that you have discovered a little known quirk in Amiga Basic. You are quite correct when you say that subprogram variables are completely hidden from the main program unless specifically indicated otherwise with a SHARED variable statement, but I think your problem lies not within the subprogram, but rather outside in the main calling program. You mentioned you have used the DEFDBL declaration to force a range of variables to double precision. This is most likely the source of the problem. These variable-type declarations apply not only to your main program, *but also to the subprograms themselves.* So, if your program has the statement

```
DEFDBL a-e
```

forcing double precision on all variables starting with letters a through e, any variables within the subprogram that meet these requirements will also be double presicion *unless explicitly stated otherwise.* The problem arises if some of your variables in the subprograms are expected to be the default type of single precision and begin with one of the letters in the a through e range. This problem is true for all five types of variable declarations, DEFDBL, DEFSNG, DEFSTR, DEFINT and DEFLNG. And the converse is also true. . .meaning type declarations within a subprogram affect the entire program, not just the subprogram they are found in.

The solution is to avoid these global-type declarations if possible, or if that isn't feasible, add a type-declaration character to the end of any variable whose type can be critical to the successful execution of your program. Each type of variable used in Amiga Basic has a distinctive trailing character, indicating that this variable (and only this variable) is to be considered a specific type of data. (See Table 1 for a list of the declaration characters.)

Perhaps you know these declaration characters but find it more expedient to use the DEFTYPE command. You should get to know them and use them whenever possible, as they can make your programs more efficient and meaningful. And, if you must use global-type declarations such as DEFDBL, you can use the declaration characters to override the global declaration.

Table 1. Declaration characters.

Symbol	Example	Meaning
#	A#	Double Precision
!	A!	Single Precision (default)
%	A%	Short Integer
&	A&	Long Integer
$	A$	String

PARLEZ-VOUS FRANÇAIS?

Q: *I am a loyal subscriber to* AmigaWorld, *but being French speaking, I would like to find a French-based Amiga journal for the* ►

The Pull-Down Menu

sake of my kids (who are not as well versed in English as I am). Are you aware of a French-based Amiga publication that I could use as my second source of Amiga information?

M. Gassend, PhD
Madagascar

A: You are in luck! I have just recently heard of a new French-language publication that caters to the Amiga. Called *A-News*, you can write for more information at the following address:

A-News
St. Aubin
24500 Eymet, France

ANALOG SPICE

Q: *In the February '88 Help Key, Mr. Castellotti asked about analog circuit simulator software for the Amiga. One of the most important is SPICE, available for the IBM PC. The educational version in publicly distributed. Because SPICE can be used without graphics, I assume the Transformer IBM emulator software would let you run it on the Amiga. If Mr. Castellotti has a Bridgeboard, he could run it without any problems. For more information, you can write to SPICE's manufacturer, MicroSim Corporation, at 23175 La Cadena Drive, Laguna Hills, CA 92653.*

J. Dudley
Amherst, MA

A: Thanks for the information.

HALF FOR DENISE

Q: *I recently tested my Amiga 1000 for the ability to use Extra HalfBrite Mode. It failed the test! Can I update my graphic chips to support it?*

A. C. Heismann
FPO San Francisco, CA

A: You can take your computer to an Amiga service center and have them replace the chip, or if you are technically inclined, you can do it yourself. Be warned that opening your computer and replacing components voids your warranty, and if you are not *very* careful, you could end up damaging the computer. The chip you need to have replaced is called Denise. According to Commodore, Extra HalfBrite Mode is supported by all A500 and A2000 models, and all A1000s made after January 1986. These all have a revision 6 or greater Denise chip, so your Amiga 1000 must have an earlier version of this chip. (My A1000 doesn't support EHB mode either, which is not surprising—it was purchased in September 1985.) According to the A1000 service manuals, the part number for Denise is C252126-01.

THE RUSSIAN 33

Q: *I am using ProWrite 2.0 with my Seikosha SP-180A1 printer and the Amiga 500. My father wants to write letters in Russian for international correspondence. The problem is that the Russian alphabet contains 33 characters and English has 26. Is there a program that will allow me to create fonts larger than 26 characters, perhaps using some sort of ALT or CTRL key combination to access the extra seven characters?*

M. Kerezman
Owega, NY

A: Yes. The program is called FED (Font EDitor), and you can find it in the Tools directory (drawer) on your 1.2 Amiga Extras disk. FED will allow you to create fonts of various sizes and shapes, including Russian. The default range is from 32–127 ASCII, but you can change it to any range within 0–255. By using the characters above ASCII 127, you can define the non-ASCII characters to anything you wish. ■

NO SCAN LINES! TOP QUALITY—*FAST*

SLIDES

NEW LOW PRICE!!

ANY IFF FILE PROCESSED DIRECTLY FROM YOUR DISK!
2k resolution 35mm slides $6.75 each and as low as $2.75 each. Also digital color separations. Now accepting Visa/MC, minimum order $25.00.
Call or write for our full service list:
ImageSet—555 19th St., San Francisco, CA 94107
(415) 626-8366



Business Software

Payroll
Accts Receivable
Check Ledger
Inventory
Accts Payable
General Ledger

call or write today for a FREE CATALOG!
(619) 436-3512

COMPUTERWARE®
Box 668-A
Encinitas, CA 92024

APL.68000

$99

A HIGHLY OPTIMIZED ASSEMBLER BASED APL INTERPRETER FOR FAST AND POWERFUL PROGRAMS. FEATURES A COMPLETE INTERFACE TO THE AMIGA ENVIRONMENT WITH PULL-DOWN MENUS, REQUESTER AND ALERT BOXES, SPEECH, SOUND AND GRAPHIC FACILITIES.

SPENCER ORGANIZATION, INC.
Westwood, N.J. 07675
P.O. Box 248
(201) 666-6011

Order Direct for $99 + 7 shipping, $10 Canada.
VISA/MC/AMEX + 4% NJ res. + 6% sales tax.

TRY BEFORE YOU BUY!

Best selling games, utilities, and classics plus new releases!

Yes We Accept: MasterCard, VISA, DISCOVER

- 100's of titles
- Low prices
- Same day shipping
- Free brochure



RENT-A-DISC
Frederick Bldg. #220
Huntington, WV 25701
(304) 529-3232

AMIGA SOFTWARE

Over 90 disks of only the best of the Public Domain and Shareware. Tested and sorted into the following categories: Animation, Applications, Games, Graphics, Information, Music, Programming, Sound, Telecommunications, and Utilities.
For a free list, send a business size SASE to:

Micro Computer Associates, Amiga Software, P.O. Box 5533, Katy, TX 77491-5533.

All Disks Tested Virus-Free

Computer-Based Instruction — Education — Interactive Video

FLIGHT TRAINING DEVICES

FTD PILOT

PROGRAMMED INQUIRY, LEARNING OR TEACHING

The standard authoring language for computer-based instruction now available for Amiga 500/1000/2000. Displays IFF graphics including HAM and Extra-Halfbrite. Laser Videodisk and Touch-Panel support included.

Orders Only:
Flight Training Devices
312 E. Imperial Ave.
El Segundo, CA 90245
800-321-9139 / 213-640-9772

$39.95
Visa MasterCard

Information:
Flight Training Devices—AK
PO Box 91723
Anchorage, AK 99509-1723
907-276-6719

LARGEST ENCYCLOPEDIA/CATALOG FOR DEDICATED COMPUTERS AND GAME UNITS



DIABLO—Graphic mind challenge game. $29.95
Lottery Assistant—Increase your odds of winning as much as 500% $39.95
Hollywood Poker—A unique strip poker game, digitized nudes not drawing $29.95

FAST SERVICE • BIG DISCOUNTS
MANY EXCLUSIVE PRODUCTS

S&H—$3.00 US
S&H—$4.00 CN
US—$'s ONLY

M.W. Ruth Co. AMW1
3100 W. Chapel Ave.
Cherry Hill, NJ 08002
(609) 667-2526

If you have developed software or hardware we would be happy to sell it for you. We also Market, Publish and Manufacture.

Typesetting

- 24 Hour Turnaround
- 24 Hour Modem Service
- Paper or Film
- Extensive Font Library

Words & Pictures
2811 McKinney #320 LB111 • Dallas, TX 75204
214-871-0498
Call Chuck McWilliam for information.

SPECIAL OFFER: A2000 MEMORY BOARDS

- Zero Wait State
- Auto-Configuring
- 512K/1MB/2MB DIP Switch

Unpopulated (OK) $175
512K, 1MB, 2MB. . . . . Call
(415) 792-6216

LEE DATA SYSTEMS

39120 Argonaut Way, Suite 165 • Fremont, CA 94538
18 month warranty on all boards

Laser Light Shows on the Amiga

The lowest-cost, highest-performance laser show system for any computer anywhere. Produce professional laser graphics for clubs, bands, planetariums, theaters, etc. Requires 1 meg Amiga and laser projector. Software from $295 to $995. Laser projectors from $1500.

Send SASE for free information to: Patrick Murphy, Pangolin Laser Software, 1016 N. Daniel St. #2, Arlington, VA 22201 or call (703) 527-4880.

Now available! Demo disk—$15 Demo VHS video—$15

FREE AMIGA KNOWLEDGE!
With an introductory order of
"The Kickstart Guide to the Amiga"
by Ariadne Software Ltd.
With introductory notes by Gail Wellington

Mention this ad when you order 6 or more "Kickstart Guides" and receive 1 guide free! This $24.95, one-time-only offer is good for Amiga dealers only as an introduction to the "Kickstart Guide" and Micro Pace Distributors! Phone your sales representative today for information on this special offer and about our full line of Amiga software and peripherals.
Call and take advantage of this introductory offer today at:
MICRO PACE DISTRIBUTORS, INC.
1212 Hagan, Champaign, IL 61820
Order toll free 800-362-9653; in Illinois 217-356-1885; FAX 217-356-0097
Serving the Commodore community with over 1600 titles since 1982

35mm COLOR SLIDES

from your IFF or HAM files

- Brilliant Color
- No Curvature Distortion

as low as $1/slide
Call or Write for order form, price list & sample

HAMMOND PHOTOGRAPHIC SERVICES
11280 Washington Place
Culver City, Ca. 90230
(213) 390-3010

AmigaWorld is a publication of IDG Communications, the world's largest publisher of computer-related information. IDG Communications publishes over 90 computer publications in 33 countries. Fourteen million people read one or more IDG Communications publications each month. IDG Communications publications contribute to the IDG News Service offering the latest on domestic and international computer news. IDG Communications publications include: ARGENTINA'S *Computerworld Argentina*; ASIA'S *Communications World, Computerworld Hong Kong, Computerworld Malaysia, Computerworld Singapore, Computerworld Southeast Asia, PC Review*; AUSTRALIA'S *Computerworld Australia, Communications World, Australian PC World, Australian Macworld*; AUSTRIA'S *Computerwelt Oesterreich*; BRAZIL'S *DataNews, PC Mundo, Micro Mundo*; CANADA'S *Computer Data;* CHILE'S *Informatica, Computacion Personal*; DENMARK'S *Computerworld Danmark, PC World Danmark*; FINLAND'S *Mikro, Tietoviikko*; FRANCE'S *Le Monde Informatique, Distributique, InfoPC, Telecoms International;* GREECE'S *Micro and Computer Age*; HUNGARY'S *Computerworld SZT, PC Mikrovilage*; INDIA'S *Dataquest*; ISRAEL'S *People & Computers Weekly, People & Computers Bi-Weekly*; ITALY'S *Computerworld Italia*; JAPAN'S *Computerworld Japan*; MEXICO'S *Computerworld Mexico*; THE NETHERLANDS' *Computerworld Netherlands, PC World Benelux*; NEW ZEALAND'S *Computerworld New Zealand*; NORWAY'S *Computerworld Norge, PC World Norge*; PEOPLE'S REPUBLIC OF CHINA'S *China Computerworld, China Computerworld Monthly*; SAUDI ARABIA'S *Arabian Computer News*; SOUTH KOREA'S *Computerworld Korea, PC World Korea*; SPAIN'S *CIMWORLD, Computerworld Espana, Commodore World, PC World Espana, Comunicaciones World, Informatica Industrial*; SWEDEN'S *Computer Sweden, Mikrodatorn, Svenska PC World*; SWITZERLAND'S *Computerworld Schweiz*; UNITED KINGDOM'S *Computer News, DEC Today, ICL Today, LOTUS, PC Business World*; UNITED STATES' *AmigaWorld, CD-ROM Review, CIO, Computer Currents, Computerworld, Computers in Science, Digital News, Federal Computer Week, 80 Micro, FOCUS Publications, inCider, InfoWorld, Macintosh Today, MacWorld, Computer + Software News, (Micro Marketworld/Lebhar-Friedman), Network World, PC World, Portable Computer Review, Publish!, PC Resource, RUN, Windows*; VENEZUELA'S *Computerworld Venezuela*; WEST GERMANY'S *Computerwoche, Information Management, PC Welt, Run, PC Woche, RUN.*

Manuscripts: Contributions in the form of manuscripts with drawings and/or photographs are welcome and will be considered for possible publication. *AmigaWorld* assumes no responsibility for loss or damage to any material. Please enclose a self-addressed, stamped envelope with each submission. Payment for the use of any unsolicited material will be made upon publication. All contributions and editorial correspondence (typed and double-spaced, please) should be directed to *AmigaWorld* Editorial, 80 Elm St., Peterborough, NH 03458; telephone: 603-924-9471. **Advertising Inquiries** should be directed to Advertising Offices, IDG Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458; telephone: 800-441-4403. **Subscription problems or address changes:** Call 1-800-525-0643 (in CO, 1-303-447-9330) or write to *AmigaWorld*, Subscription Dept., PO Box 58804, Boulder, CO 80322-8804. **Problems with advertisers:** Send a description of the problem and your current address to: *AmigaWorld*, 80 Elm St., Peterborough, NH 03458, ATTN.: Lisa LaFleur, Customer Service Representative.

List of Advertisers

* This advertiser prefers to be contacted directly

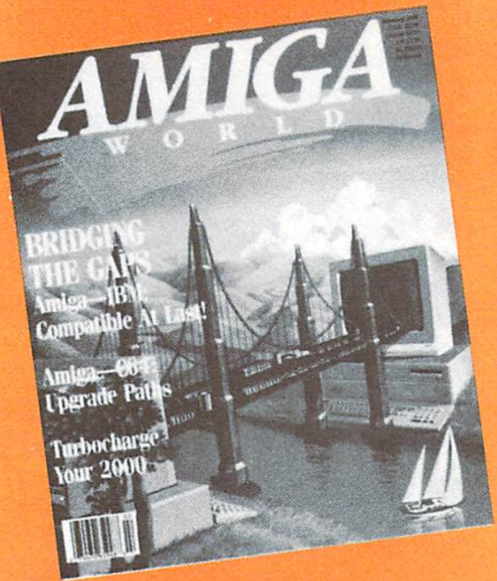
This index is provided as an additional service. The publisher does not assume liability for errors or omissions.

FYI

As a service to its readers, *AmigaWorld* will periodically publish the names of companies who are having difficulties meeting their customer obligations or who have gone out of business. Readers are advised to contact *AmigaWorld* before dealing with these companies: **Computer Best, FutureSoft Applications**. If you have any questions or concerns about advertisers in *AmigaWorld*, please contact: **Lisa LaFleur, Customer Service Representative, *AmigaWorld* Magazine, 80 Elm Street, Peterborough, NH 03458.** Through our customer service representative, *AmigaWorld* assists readers with problems they may have with advertisers. However, *AmigaWorld* does not assume any liability for advertiser's claims.

AMIGA WORLD

Subscribe And Save Nearly 47% OFF The Cover Price



- *AmigaWorld*. . .the only high-quality Amiga-specific magazine on the market. It's as fresh and dazzling as the computer itself!
- *AmigaWorld*. . .where expert authors will lead you through the exciting and revolutionary features of the Amiga!
- *AmigaWorld*. . .helping you discover and utilize a whole new world of computer graphics and sounds!
- *AmigaWorld*. . .because creative computing was never so exciting and easy!

Get 12 Issues of AmigaWorld for $24.97. That's 47% Off The Basic Newsstand Price!

The IDG Communications Guarantee

As the world's largest publisher of computer-related information, we unconditionally guarantee your *AmigaWorld* subscription. If you're not completely satisfied, tell us. We'll refund the full price of your subscription—no questions asked.

YES. I want to save 47% off the newsstand rate. Enter my 12 issue subscription to AmigaWorld for the low subscription price of $24.97. If I'm not satisfied at any time, I will receive a full refund—no questions asked!

Name ____________________

Address ____________________

City __________ State ______ Zip ______

Please make checks payable to AmigaWorld.

Canada $34.97, Mexico $32.97, Foreign Surface $47.97, Foreign Airmail $82.97 (U.S. Funds drawn on U.S. Bank). All rates are 1 year only. Please allow 6–8 weeks for delivery.

AMIGA WORLD

4A8G1

YES. I want to save 47% off the newsstand rate. Enter my 12 issue subscription to AmigaWorld for the low subscription price of $24.97. If I'm not satisfied at any time, I will receive a full refund—no questions asked!

Name ____________________

Address ____________________

City __________ State ______ Zip ______

Please make checks payable to AmigaWorld.

Canada $34.97, Mexico $32.97, Foreign Surface $47.97, Foreign Airmail $82.97 (U.S. Funds drawn on U.S. Bank). All rates are 1 year only. Please allow 6–8 weeks for delivery.

AMIGA WORLD

4A8G1

YES. I want to save 47% off the newsstand rate. Enter my 12 issue subscription to AmigaWorld for the low subscription price of $24.97. If I'm not satisfied at any time, I will receive a full refund—no questions asked!

Name ____________________

Address ____________________

City __________ State ______ Zip ______

Please make checks payable to AmigaWorld.

Canada $34.97, Mexico $32.97, Foreign Surface $47.97, Foreign Airmail $82.97 (U.S. Funds drawn on U.S. Bank). All rates are 1 year only. Please allow 6–8 weeks for delivery.

AMIGA WORLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED
STATES

BUSINESS REPLY MAIL

FIRST-CLASS PERMIT NO. 1247 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

IDG Communications/Peterborough
AmigaWorld
P.O. Box 50365
Boulder, CO 80321-0365

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED
STATES

BUSINESS REPLY MAIL

FIRST-CLASS PERMIT NO. 1247 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

IDG Communications/Peterborough
AmigaWorld
P.O. Box 50365
Boulder, CO 80321-0365

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED
STATES

BUSINESS REPLY MAIL

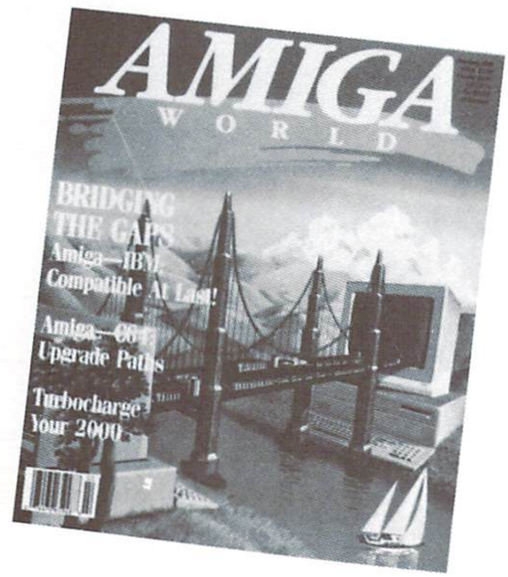
FIRST-CLASS PERMIT NO. 1247 BOULDER, CO

POSTAGE WILL BE PAID BY ADDRESSEE

IDG Communications/Peterborough
AmigaWorld
P.O. Box 50365
Boulder, CO 80321-0365

AMIGA WORLD

Subscribe And Save Nearly 47% OFF The Cover Price



- *AmigaWorld*. . .the only high-quality Amiga-specific magazine on the market. It's as fresh and dazzling as the computer itself!
- *AmigaWorld*. . .where expert authors will lead you through the exciting and revolutionary features of the Amiga!
- *AmigaWorld*. . .helping you discover and utilize a whole new world of computer graphics and sounds!
- *AmigaWorld*. . .because creative computing was never so exciting and easy!

Get 12 Issues of AmigaWorld for $24.97. That's 47% Off The Basic Newsstand Price!

The IDG Communications Guarantee

As the world's largest publisher of computer-related information, we unconditionally guarantee your *AmigaWorld* subscription. If you're not completely satisfied, tell us. We'll refund the full price of your subscription—no questions asked.

TO RECEIVE MORE INFORMATION

AMIGA WORLD

TEAR
out the perforated card. Please print or type your name and address where indicated.

CIRCLE
the numbers on the card that correspond to the reader service numbers on the advertisements that interest you.

ORDER
a one year subscription to AmigaWorld by circling 500 on the card.

MAIL
the card with your check, money order or U.S. currency to:
AmigaWorld
Reader Service
Management Department
P.O. Box 5170
Pittsfield, MA 01203-5170
Or, you may request billing.

LOOK FOR
your subscription in 10 to 12 weeks.

REMEMBER
to put the proper postage on the card.

READER SERVICE

August card valid until October 31, 1988.

Name ______________________

Address ______________________

City/State/Zip ______________________

Telephone ______________________

A. How would you rate this issue of AmigaWorld? (pick one)
☐ 1. GREAT! ☐ 5. Fair
☐ 2. Very Good ☐ 6. Poor
☐ 3. Pretty Good ☐ 7. Very Poor
☐ 4. Good ☐ 8. Terrible

B. What will be your next major peripheral purchase?
☐ 1. Monitor ☐ 6. Sidecar
☐ 2. Printer ☐ 7. Gen Lock or Frame Grabber
☐ 3. Modem ☐ 8. Music (Midi, Keyboard, etc.)
☐ 4. Memory Expansion ☐ 9. Other
☐ 5. Disk Drive (hard or floppy)

C. Check all of the endings that best complete this sentence: "Most of AmigaWorld is . . ."
☐ 1. Just Right ☐ 6. Useless
☐ 2. Too Simple ☐ 7. Interesting
☐ 3. Too Complex ☐ 8. Biased
☐ 4. Fluff ☐ 9. Invaluable
☐ 5. Useful

D. What topics would you like to see covered in future issues of AmigaWorld? (Please pick three.)
☐ 1. C Language ☐ 11. How others use the Amiga
☐ 2. Amiga Basic ☐ 12. Buyer's Guides
☐ 3. CLI ☐ 13. Comparative Reviews
☐ 4. Telecommunications ☐ 14. Music
☐ 5. Business Applications ☐ 15. Graphics
☐ 6. IBM Compatibility ☐ 16. Program Listings
☐ 7. Home Applications ☐ 17. New Products
☐ 8. Education ☐ 18. Opinions
☐ 9. Video ☐ 19. Hardware Projects
☐ 10. Science and Engineering ☐ 20. Other

E. What are your favorite things about AmigaWorld? (Please pick all that apply.)
☐ 1. Zeitgeist (Editor's Page) ☐ 7. Hors d'oeuvres (hints/tips)
☐ 2. Repartee (Letters) ☐ 8. Advertisements
☐ 3. Interviews ☐ 9. Reviews
☐ 4. Help Key (Questions) ☐ 10. Notepad (News)
☐ 5. Features ☐ 11. Digital Canvas
☐ 6. Tutorials ☐ 12. Articles
☐ 13. Covers ☐ 15. Everything
☐ 14. Reader Service Card

F. Which of the following categories do you plan to purchase software from in the next 12 months?
☐ 1. Entertainment ☐ 9. Database Management
☐ 2. Word Processing ☐ 10. Financial Management
☐ 3. Communications ☐ 11. Graphics
☐ 4. Spreadsheets ☐ 12. Education
☐ 5. Home Productivity ☐ 13. Music
☐ 6. Programming ☐ 14. Hardware Development
☐ 7. Software Development ☐ 15. Sound/Speech Development
☐ 8. Video/Graphics Creation ☐ 16. CAD/CAM

G. Where did you get this copy of AmigaWorld?
☐ 1. I subscribe ☐ 3. Other
☐ 2. Newsstand

H. Where do you buy your computer products? (Please pick one.)
☐ 1. Computer Dealer ☐ 4. Discount/Department Store
☐ 2. Mail Order ☐ 5. Other ______
☐ 3. Manufacturer

I. Do you own an Amiga?
☐ 1. Yes ☐ 2. No

J. Where do you use your Amiga?
☐ 1. Home ☐ 5. Both at home and work
☐ 2. Work ☐ 6. Both at home and school
☐ 3. School ☐ 7. I don't use an Amiga
☐ 4. At home for business

K. Is this your copy of AmigaWorld?
☐ 1. Yes ☐ 2. No

L. If you are not a subscriber, please circle 499.

M. If you would like a one year subscription to AmigaWorld (12 issues), please circle 500 on this card. Each subscription is $24.97, Canada $50.97 (Canadian Funds), Mexico $32.97, Foreign Surface $47.97, Foreign Airmail $82.97 (U.S. funds drawn on U.S. bank). Please allow 10–12 weeks for delivery.

1	6	11	16	21	201	206	211	216	221	401	406	411	416	421
2	7	12	17	22	202	207	212	217	222	402	407	412	417	422
3	8	13	18	23	203	208	213	218	223	403	408	413	418	423
4	9	14	19	24	204	209	214	219	224	404	409	414	419	424
5	10	15	20	25	205	210	215	220	225	405	410	415	420	425
26	31	36	41	46	226	231	236	241	246	426	431	436	441	446
27	32	37	42	47	227	232	237	242	247	427	432	437	442	447
28	33	38	43	48	228	233	238	243	248	428	433	438	443	448
29	34	39	44	49	229	234	239	244	249	429	434	439	444	449
30	35	40	45	50	230	235	240	245	250	430	435	440	445	450
51	56	61	66	71	251	256	261	266	271	451	456	461	466	471
52	57	62	67	72	252	257	262	267	272	452	457	462	467	472
53	58	63	68	73	253	258	263	268	273	453	458	463	468	473
54	59	64	69	74	254	259	264	269	274	454	459	464	469	474
55	60	65	70	75	255	260	265	270	275	455	460	465	470	475
76	81	86	91	96	276	281	286	291	296	476	481	486	491	496
77	82	87	92	97	277	282	287	292	297	477	482	487	492	497
78	83	88	93	98	278	283	288	293	298	478	483	488	493	498
79	84	89	94	99	279	284	289	294	299	479	484	489	494	499
80	85	90	95	100	280	285	290	295	300	480	485	490	495	500
101	106	111	116	121	301	306	311	316	321	501	506	511	516	521
102	107	112	117	122	302	307	312	317	322	502	507	512	517	522
103	108	113	118	123	303	308	313	318	323	503	508	513	518	523
104	109	114	119	124	304	309	314	319	324	504	509	514	519	524
105	110	115	120	125	305	310	315	320	325	505	510	515	520	525
126	131	136	141	146	326	331	336	341	346	526	531	536	541	546
127	132	137	142	147	327	332	337	342	347	527	532	537	542	547
128	133	138	143	148	328	333	338	343	348	528	533	538	543	548
129	134	139	144	149	329	334	339	344	349	529	534	539	544	549
130	135	140	145	150	330	335	340	345	350	530	535	540	545	550
151	156	161	166	171	351	356	361	366	371	551	556	561	566	571
152	157	162	167	172	352	357	362	367	372	552	557	562	567	572
153	158	163	168	173	353	358	363	368	373	553	558	563	568	573
154	159	164	169	174	354	359	364	369	374	554	559	564	569	574
155	160	165	170	175	355	360	365	370	375	555	560	565	570	575
176	181	186	191	196	376	381	386	391	396	576	581	586	591	596
177	182	187	192	197	377	382	387	392	397	577	582	587	592	597
178	183	188	193	198	378	383	388	393	398	578	583	588	593	598
179	184	189	194	199	379	384	389	394	399	579	584	589	594	599
180	185	190	195	200	380	385	390	395	400	580	585	590	595	600

READER SERVICE

August card valid until October 31, 1988.

Name ______________________

Address ______________________

City/State/Zip ______________________

Telephone ______________________

A. How would you rate this issue of AmigaWorld? (pick one)
☐ 1. GREAT! ☐ 5. Fair
☐ 2. Very Good ☐ 6. Poor
☐ 3. Pretty Good ☐ 7. Very Poor
☐ 4. Good ☐ 8. Terrible

B. What will be your next major peripheral purchase?
☐ 1. Monitor ☐ 6. Sidecar
☐ 2. Printer ☐ 7. Gen Lock or Frame Grabber
☐ 3. Modem ☐ 8. Music (Midi, Keyboard, etc.)
☐ 4. Memory Expansion ☐ 9. Other
☐ 5. Disk Drive (hard or floppy)

C. Check all of the endings that best complete this sentence: "Most of AmigaWorld is . . ."
☐ 1. Just Right ☐ 6. Useless
☐ 2. Too Simple ☐ 7. Interesting
☐ 3. Too Complex ☐ 8. Biased
☐ 4. Fluff ☐ 9. Invaluable
☐ 5. Useful

D. What topics would you like to see covered in future issues of AmigaWorld? (Please pick three.)
☐ 1. C Language ☐ 11. How others use the Amiga
☐ 2. Amiga Basic ☐ 12. Buyer's Guides
☐ 3. CLI ☐ 13. Comparative Reviews
☐ 4. Telecommunications ☐ 14. Music
☐ 5. Business Applications ☐ 15. Graphics
☐ 6. IBM Compatibility ☐ 16. Program Listings
☐ 7. Home Applications ☐ 17. New Products
☐ 8. Education ☐ 18. Opinions
☐ 9. Video ☐ 19. Hardware Projects
☐ 10. Science and Engineering ☐ 20. Other

E. What are your favorite things about AmigaWorld? (Please pick all that apply.)
☐ 1. Zeitgeist (Editor's Page) ☐ 7. Hors d'oeuvres (hints/tips)
☐ 2. Repartee (Letters) ☐ 8. Advertisements
☐ 3. Interviews ☐ 9. Reviews
☐ 4. Help Key (Questions) ☐ 10. Notepad (News)
☐ 5. Features ☐ 11. Digital Canvas
☐ 6. Tutorials ☐ 12. Articles
☐ 13. Covers ☐ 15. Everything
☐ 14. Reader Service Card

F. Which of the following categories do you plan to purchase software from in the next 12 months?
☐ 1. Entertainment ☐ 9. Database Management
☐ 2. Word Processing ☐ 10. Financial Management
☐ 3. Communications ☐ 11. Graphics
☐ 4. Spreadsheets ☐ 12. Education
☐ 5. Home Productivity ☐ 13. Music
☐ 6. Programming ☐ 14. Hardware Development
☐ 7. Software Development ☐ 15. Sound/Speech Development
☐ 8. Video/Graphics Creation ☐ 16. CAD/CAM

G. Where did you get this copy of AmigaWorld?
☐ 1. I subscribe ☐ 3. Other
☐ 2. Newsstand

H. Where do you buy your computer products? (Please pick one.)
☐ 1. Computer Dealer ☐ 4. Discount/Department Store
☐ 2. Mail Order ☐ 5. Other ______
☐ 3. Manufacturer

I. Do you own an Amiga?
☐ 1. Yes ☐ 2. No

J. Where do you use your Amiga?
☐ 1. Home ☐ 5. Both at home and work
☐ 2. Work ☐ 6. Both at home and school
☐ 3. School ☐ 7. I don't use an Amiga
☐ 4. At home for business

K. Is this your copy of AmigaWorld?
☐ 1. Yes ☐ 2. No

L. If you are not a subscriber, please circle 499.

M. If you would like a one year subscription to AmigaWorld (12 issues), please circle 500 on this card. Each subscription is $24.97, Canada $50.97 (Canadian Funds), Mexico $32.97, Foreign Surface $47.97, Foreign Airmail $82.97 (U.S. funds drawn on U.S. bank). Please allow 10–12 weeks for delivery.

1	6	11	16	21	201	206	211	216	221	401	406	411	416	421
2	7	12	17	22	202	207	212	217	222	402	407	412	417	422
3	8	13	18	23	203	208	213	218	223	403	408	413	418	423
4	9	14	19	24	204	209	214	219	224	404	409	414	419	424
5	10	15	20	25	205	210	215	220	225	405	410	415	420	425
26	31	36	41	46	226	231	236	241	246	426	431	436	441	446
27	32	37	42	47	227	232	237	242	247	427	432	437	442	447
28	33	38	43	48	228	233	238	243	248	428	433	438	443	448
29	34	39	44	49	229	234	239	244	249	429	434	439	444	449
30	35	40	45	50	230	235	240	245	250	430	435	440	445	450
51	56	61	66	71	251	256	261	266	271	451	456	461	466	471
52	57	62	67	72	252	257	262	267	272	452	457	462	467	472
53	58	63	68	73	253	258	263	268	273	453	458	463	468	473
54	59	64	69	74	254	259	264	269	274	454	459	464	469	474
55	60	65	70	75	255	260	265	270	275	455	460	465	470	475
76	81	86	91	96	276	281	286	291	296	476	481	486	491	496
77	82	87	92	97	277	282	287	292	297	477	482	487	492	497
78	83	88	93	98	278	283	288	293	298	478	483	488	493	498
79	84	89	94	99	279	284	289	294	299	479	484	489	494	499
80	85	90	95	100	280	285	290	295	300	480	485	490	495	500
101	106	111	116	121	301	306	311	316	321	501	506	511	516	521
102	107	112	117	122	302	307	312	317	322	502	507	512	517	522
103	108	113	118	123	303	308	313	318	323	503	508	513	518	523
104	109	114	119	124	304	309	314	319	324	504	509	514	519	524
105	110	115	120	125	305	310	315	320	325	505	510	515	520	525
126	131	136	141	146	326	331	336	341	346	526	531	536	541	546
127	132	137	142	147	327	332	337	342	347	527	532	537	542	547
128	133	138	143	148	328	333	338	343	348	528	533	538	543	548
129	134	139	144	149	329	334	339	344	349	529	534	539	544	549
130	135	140	145	150	330	335	340	345	350	530	535	540	545	550
151	156	161	166	171	351	356	361	366	371	551	556	561	566	571
152	157	162	167	172	352	357	362	367	372	552	557	562	567	572
153	158	163	168	173	353	358	363	368	373	553	558	563	568	573
154	159	164	169	174	354	359	364	369	374	554	559	564	569	574
155	160	165	170	175	355	360	365	370	375	555	560	565	570	575
176	181	186	191	196	376	381	386	391	396	576	581	586	591	596
177	182	187	192	197	377	382	387	392	397	577	582	587	592	597
178	183	188	193	198	378	383	388	393	398	578	583	588	593	598
179	184	189	194	199	379	384	389	394	399	579	584	589	594	599
180	185	190	195	200	380	385	390	395	400	580	585	590	595	600

READER SERVICE

TO RECEIVE MORE INFORMATION

AMIGA WORLD

TEAR
out the perforated card. Please print or type your name and address where indicated.

CIRCLE
the numbers on the card that correspond to the reader service numbers on the advertisements that interest you.

ORDER
a one year subscription to AmigaWorld by circling 500 on the card.

MAIL
the card with your check, money order or U.S. currency to:
AmigaWorld
Reader Service
Management Department
P.O. Box 5170
Pittsfield, MA 01203-5170
Or, you may request billing.

LOOK FOR
your subscription in 10 to 12 weeks.

REMEMBER
to put the proper postage on the card.

READER SERVICE

PLEASE USE
FIRST CLASS
LETTER
POSTAGE

AmigaWorld
Reader Service
Management Department
P.O. Box 5170
Pittsfield, MA 01203-5170

PLEASE USE
FIRST CLASS
LETTER
POSTAGE

AmigaWorld
Reader Service
Management Department
P.O. Box 5170
Pittsfield, MA 01203-5170

Shhh, Master at Work.



Introducing the

MASTER-3A

$3^{1/2}$" Compatible Disk Drive

Inside the incredibly small Master 3A is a powerhouse of advanced technology for your Amiga.®

Extra long cable lets you position the drive where you want it.
Additional serial port allows daisy chaining.
100% compatible. Fully guaranteed.

Ask your dealer for the Master 3A compatible drive.

Manufactured by **Oceanic America** P.O. Box 70587, Eugene, OR / 503-741-1222 / Fax 503-741-1535 / **DEALER INQUIRIES INVITED**

Circle 117 on Reader Service card.